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ABSTRACT

This volume of abstracts of research papers includes authors' abstracts of 147 original research papers scheduled for presentation at the Kansas City, Missouri, Convention of the American Alliance for Health, Physical Education, and Recreation, April 7-11, 1978. The papers are grouped by topic for each session. The name and address of the author are included with each abstract. An index of authors is presented at the conclusion of this volume. (Editor/JD)

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ABSTRACTS

Research Papers 1978 AAHPER Convention

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ABSTRACTS

of Research Papers 1978

Presented at the Kansas City, Missouri Convention of the
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in the Research Consortium Meetings

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PREFACE

This volume of Abstracts of Research Papers 1978 includes abstracts, precisely as submitted by authors of 145 original research papers scheduled for presentation at the Kansas City, Missouri Convention of the American Alliance for Health, Physical Education, and Recreation, April 7-11, 1978. The papers were grouped by topic for each session, as noted in the table of contents.

The time and date for the presentation of each original research paper are indicated in the lower left-hand corner. In all cases, the name and address of the author to whom inquiries for further information may be sent appear in the lower right-hand corner. An index of all authors is presented at the conclusion of this volume.

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CONTENTS

Youth Sport I (Free Papers)	1
Sport Psychology (Free Papers)	7
Motor Learning I (Free Papers)	15
Physiology of Exercise and Physical Fitness - Poster Session #1	25
International Research in Sport and Physical Education (Free Papers)	40
Psychology and Motor Learning (Free Papers)	52
Kinesiology, Health Education and Dance - Poster Session #2	62
Kinesiology-Biomechanics (Free Papers)	76
Physiology of Exercise I (Free Papers)	82
Physical Activity for the Handicapped (Free Papers)	93
Physiology of Exercise II (Free Papers)	102
Teacher Behavior (Free Papers)	110
Physical Fitness (Free Papers)	119
Motor Learning II (Free Papers)	126
Dance, History of Sport, Injury (Free Papers)	134
Body Composition (Free Papers)	141

HISTORICAL COMPARISON OF SEX AND AGE DIFFERENCES IN THE RECREATIONAL SPORT PARTICIPATION OF CHILDREN. Crystal Fountain and Vern Seefeldt, Michigan State University

The primary purpose of this study was to compare the activity preferences of boys and girls currently enrolled in Michigan's public and private schools with those of children dating back to the turn of the century. Subproblems to this investigation were: a)the degree of participation in recreational or free-play sports of Michigan children and b)the age-level by sex trends in sports participation of Michigan children. Data were gathered via questionnaires administered to 93,090 students and their parents in a random sample of public and private school districts. Responses of the subjects were measured by frequency counts, expressed in percentage figures for comparative purposes. Results indicated a continual trend for greater similarity in patterns of sport participation between males and females when compared to earlier investigations. However, the percent of participation by males in contact sports continued to be greater than for females. Team sports continued to be more popular than individual sports at the youngest ages, peaked around age 12 years and declined in popularity thereafter. Participation in most individual/dual sports increased throughout the ages of 5-16 years; however, participation in several sports (e.g. swimming) was high at all age levels, while some sports (e.g. karate) held very little interest throughout the age range studied.

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April 7, 1978
9:00 am

NUTRITIONAL HABITS OF PARTICIPANTS IN YOUTH SPORTS PROGRAMS OF MICHIGAN. Barbara Campaigne, The University of Michigan; Stan Sady, The University of Michigan; David Blievernight, Wayne State University; John Villanacci, The University of Michigan.

The purpose of this study was to determine the general nutritional habits of children who participated in agency-sponsored youth sports. Questionnaires were completed by 1162 boys and girls 11 to 18 years of age from a random sample of 93,090 participants in the longitudinal Youth Sports Project in the State of Michigan. The participants were from 89 school districts randomly selected according to geographical location, population density, school district size and grade level. The ingestion of liquids during practices and contests was permitted for 87 percent of the children, with water being the liquid most often available. Salt tablets were available to 6 percent of the participants. About 12 percent of the athletes used special foods or vitamins during the sport season on the recommendation of either parents, coaches, or of their own volition. Although one-half of the children were required to change the times when they normally ate meals, due to scheduled practices or games, only 36 percent of them ate fewer meals with their family. Only a small proportion (1-5 percent) of the subjects were required to change weight (loss or gain) in order to participate in their particular sport. In such cases either the coach or the participant made the decision to change the previous weight. No substantial differences in nutritional habits were noted between male and female responses. In general, the results of this survey suggest that reasonable nutritional habits were practiced by most of the participants. However, family meal times were frequently disrupted as a result of sports participation.

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April 7, 1978
9:15 am

ILLNESSES AND INJURIES ASSOCIATED WITH YOUTH SPORTS PROGRAMS IN MICHIGAN. Russell Bruce, Lake Superior State College, Sault Ste. Marie, Michigan; Ilene Mattson, Lake Superior State College, Sault Ste. Marie, Michigan.

The purpose of this study was to determine the frequency of illnesses and injuries associated with participation in agency-sponsored sports. Questionnaires were completed by 1162 boys and girls 11 to 18 years of age from a random sample of 93,090 participants in the longitudinal Youth Sports Project in the State of Michigan. The participants were from 89 school districts, randomly selected according to geographical location, population density, school district size and grade level. Of the 218 males and 169 females who were ill during their competitive season, 28 percent of the males and 29 percent of the females practiced or competed during the illness, and approximately 32 percent competed or practiced while receiving prescribed medication. It was the judgment of 15 percent of the boys and 24 percent of the girls that athletic participation increased the severity of the illness. The decision to participate while ill was made primarily by the participants and their parents. Approximately 6 percent of the sample were injured during participation. The most common sites of injury included the ankle, knee, finger, lower arm, and head. Head injuries were reported only by the females in the sample. Broken bones and sprains accounted for 50 percent of the types of injuries reported. The length of time during which the injured participant was unable to play exceeded one week in 60 percent of the cases. Approval from a physician to participate following an injury was obtained only 45 percent of the time. In conclusion, a majority of the children in agency-sponsored competition in the State of Michigan participated while free of illnesses and incurred only infrequent injuries.

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April 7, 1978
9:30 am

MOTIVATION FOR JOINING AND REASONS FOR NOT CONTINUING IN YOUTH SPORTS PROGRAMS IN MICHIGAN. Molly Sapp and John Haubenstricker, Michigan State University.

The purpose of this study was twofold: (1) to identify and compare the reasons boys and girls participate in agency-sponsored sports as perceived by the competitors themselves and their parents, and (2) to identify and compare reasons for discontinuing participation in the same organized sport programs. Questionnaires were completed by two groups of subjects (athletes and parents) who were selected from a random sample of 93,090 participants in a longitudinal study of youth sports in the State of Michigan. The participants were from 89 school districts randomly selected according to geographical location, population density, school district size and grade level. Of the multiple reasons for participation in sports programs that were identified by the competitors, 93 percent of the boys and 96 percent of the girls indicated that they competed to have "fun". In addition, 80 percent of both sexes participated to "improve their sports skills" while 56 percent wanted to "become physically fit". Although both boys and girls (about 53 percent) participated because "their friends played", more girls (44 percent) than boys (36 percent) joined the programs to "make new friends". Parental responses to the same questions indicated that they encouraged their children to compete for similar reasons. However 36 percent of the parents were also of the opinion that participation in sports enabled the child to "feel important" whereas only 10 percent of the athletes felt this to be a significant reason. Of the boys (30 percent) and girls (50 percent) who did not plan to continue in the sports program, "involvement in other activities" (nearly 66 percent) and "working" (about 44 percent) were identified as the major reasons by both boys and girls. Parents also ranked "involvement in other activities" (about 65 percent for both boys and girls) as the major reason for not participating. However, only 9 percent of the boys' parents and 8 percent of the girls' parents thought that "working" would prevent their child from participating. In summary, the major reasons for participating in youth sports programs were equally important to both boys and girls with the exception that making new friends provided a greater incentive for girls than boys. Although involvement in other activities and working are the primary reasons expressed by participants for dropping out of sports programs, the latter was not considered a primary motive by their parents.

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April 7, 1978
9:45 am

A STUDY OF PARENTAL VIEWS CONCERNING OBJECTIVES AND POLICIES OF YOUTH SPORTS PROGRAMS IN MICHIGAN. Richard Howell, David Hird and Richard Evans, Michigan State University.

This investigation examined data concerning parental views of objectives and policies of agency-sponsored youth sports programs. Questionnaires were completed by the parents of 1466 boys and girls between the ages of 6-18 years from a random sample of 93,090 original participants in a longitudinal Youth Sports Project in the state of Michigan. The participants were obtained from 89 school districts randomly selected according to geographic location, population density, school district size and grade level. The availability of written objectives from the sports programs and the effort of involved groups to meet the objectives were studied. Written objectives for the programs were available to 55 percent of the parents of male competitors and to 46 percent of the parents of female participants. Ninety-eight percent of those who received written objectives said they agreed with the stated purposes of the programs. However, only 84 percent were of the opinion that other parents made a serious effort to meet those objectives. Approximately 91 percent felt the coaches and athletes made an effort to meet them, and slightly more than 75 percent thought the officials and league administrators complied with the objectives. League policies with regard to medical aspects and conditions of safety were also studied. Twenty-two percent of the parents reported that their children were required to take a physical examination before becoming involved in agency-sponsored competition. Parents of 43 percent of the participants were of the impression that adequate first aid and medical attention were available at practices and games, and the services of an athletic trainer were provided in 27 percent of the cases. In summary, about one-half of the parents of agency-sponsored sport participants received written notice of the objectives concerning their child's program. Of those, most thought that individuals involved with the programs were supportive of the stated objectives. Health care of the participants was apparently not a primary concern, as adequate first aid and training services were often not available at practices and games, and few programs required physical examinations of the participants.

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April 7, 1978
10:00 am

STATUS OF TRAINING AND CONDITIONING PROVISIONS IN YOUTH SPORTS PROGRAMS OF MICHIGAN. Rodney Grambeau, The University of Michigan, Ann Arbor; Patty Freedson, The University of Michigan, Ann Arbor.

The purpose of this study was to investigate the availability of training and conditioning programs in Michigan's agency-sponsored youth sports. Questionnaires were completed by 1162 boys and girls 11 to 18 years of age, selected from a random sample of 93,090 participants in the longitudinal Youth Sports Project. The participants came from 89 school districts randomly selected according to geographical location, population density, school district size and grade level. Male-female similarities were identified with regard to warm-up and training procedures. Warm-up was a part of the preparation prior to practice sessions and formal competition for 90 percent of the participants. Sprint running served as the primary running technique for conditioning by 40 percent of the participants, whereas 20 percent used long distance running. The greatest difference in training procedures between boys and girls was in weight training, in which a larger percentage of males engaged more frequently (by 11 percent). Approximately 50 percent of the boys and girls used calisthentics as part of their training program. The use of contraindicative exercises was also similar for males and females. Approximately 30 percent of the athletes included deep knee bends, double leg lifts and straight leg situps in their training regimens, whereas only 5 percent used the duck walk. In summary, male and female athletes participated in similar patterns of training with the major emphasis placed on running. Approximately one third of the participants engaged in one or more contraindicative exercises.

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April 7, 1978
10:15 am

THE RELATIONSHIP OF SEX, LEADER BEHAVIOR, LEADERSHIP STYLE AND COACH PLAYER INTERACTION. Frank J. Keane, Cleveland State University; John T. F. Cheffers, Boston University.

This study was conducted to describe and analyze the effect of sex of the coach on the parameters of leadership style, leader behavior and coach player interaction. The sample consisted of 10 coaches (N=10) from a major Eastern University. Five male and five female coaches were asked to complete the Leader Behavior Description Questionnaire XII (LBDQ) and the Groups Atmosphere Scale (GA), which measures leader-member relations. Six randomly selected players from each team were asked to complete the Least Preferred Co-Worker Scale (LPC), which measured the leadership style of the player's coach. Coach player interaction was observed and coded using eight selected parameters of Cheffer's Adaptation of Flander's Interaction Analysis System (CAFIAS). Analysis revealed the following: (1) No significant differences were found between male and female coaches on the dimension of leadership style as measured by (LPC). Differences did not exist between the sexes but rather within a sex ($P < .05$). (2) No significant differences were found between male and female coaches on the dimension of leader-member relations as measured by GA. Male and female coaches perceive their relationship with their respective teams in relatively similar and favorable terms ($P < .05$). (3) No significant differences were found between sex of the coach and coach-player interaction on the parameters of TOTAL coach contribution. Total player contribution, coach use of questions, coach response ratio, emphasis on content, verbal and non-verbal behavior. On the parameter of player initiation a significant difference was found, indicating that players may be willing to take more risks with female coaches or that female coaches may encourage more player initiative. These variables were considered in a multiple regression analysis model. ($P < .01$). (4) Multiple analysis of variance revealed no significant main effect differences for sex, leadership style and leader behavior. When the interactive effect was considered, a significant difference was found on the leader behavior sub-scales of tolerance of uncertainty and consideration. ($P < .01$) (5) Four of the CAFIAS parameters considered were found to be successful predictions of a coaches leadership style. ($P < .05$).

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April 7, 1978
1:00 pm

THE EFFECT OF AN EXERCISE CONDITIONING PROGRAM ON SELF-CONCEPT AND PERSONALITY IN ADULTS. Gerald Quinn, M.A.; John A. White, M.S., Ph.D., University of Salford, England.

The purpose of the study was to determine the changes, if any, in self-concept as measured by the Tennessee Self-Concept Scale, and personality traits as measured by the Eysenck Personality Inventory, associated with a ten week intensive exercise course involving adult males and females. Procedure: Fifty subjects (25 males, 25 females) were subjected to a standardised program of calisthenics, jogging and recreational activities. Selected physiological parameters, Tennessee Self-Concept Scale and Eysenck Personality Inventory measures were determined before and after the course. Data Analysis: Means, standard errors and standardised scores were calculated from raw scores of the Tennessee Self-Concept Scale, the Eysenck Personality Inventory scores and physiological data. T-tests and F-ratios were utilised to determine pre-post program changes. Canonical correlation was used to evaluate relationships between the linear sets of the Tennessee Self-Concept scale, Eysenck Personality profile and physiological measures. Results: Changes in the Tennessee Self-Concept Scale scores and improvements in extraversion and stability scores on the Eysenck Personality Inventory relating to the domains of physiological self, personal self, and social self accompanied significant improvements in physiological function, as evidenced by change in the degree of association between the two sets of variates from pre- to post-tests. Conclusions: The study provides evidence that a well organised program of exercise conditioning contributes to the psychosocial and physiological well-being of the participant.

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April 7, 1978
1:15 pm

PSYCHOLOGICAL ASPECTS OF FEMALE COLLEGE ATHLETES. Barbara R. Wilcoxon, Austin College.

The psychological androgyny (masculinity-femininity), self-esteem and social competence of female college athletes (N=75) at Arizona State University were tested using the Personal Attributes Questionnaire (PAQ) and the Texas Social Behavior Inventory (TSBI). The PAQ scores for the total group resulted in classifications of 13.3 percent Undifferentiated, 10.7 percent Feminine, 40.0 percent Masculine and 36.0 percent Androgynous. Team sport athletes were 14.7 percent, 11.8 percent, 38.2 percent and 35.3 percent respectively. The individual sport athletes were 12.2 percent, 9.8 percent, 41.5 percent, and 36.6 percent respectively. The TSBI mean for all female athletes was 42.71, team sport athletes 43.33, and individual sport athletes 41.46, all of which are above the national female college student mean of 40.64. By a simple 1 x 4 ANOVA a significant difference was found among the classifications on TSBI beyond the .001 level of significance. This research seems to suggest that the female athlete is no longer being threatened by social sanctions and stereotyping. She is displaying high levels of femininity as well as high levels of masculinity which is consistent with competitive, aggressive behavior. The female athlete also has displayed high self-esteem and social competence which indicates greater self confidence and self perception in and out of the context of sports.

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April 7, 1978
1:30 pm

SEX-ROLE PRESCRIPTIONS AND ATTITUDES OF PHYSICAL EDUCATORS.

Mary J. Hoferek, University of Wisconsin

The purpose of the study was to determine the applicability of the current reconceptualization of sex-roles, particularly the androgyny concept, to the physical education setting. Unlike the bipolar model of masculinity and femininity, the androgyny model, as conceptualized by Bem, allows for the possibility that one individual could possess both the instrumental characteristics necessary for success in physical activities and the socio-emotional characteristics usually associated with femininity. This research investigated several hypotheses relating androgynous or sex-typed development to the objectives valued in physical education classes, attitudes towards participation of females, and expectations for performance. The Bem Sex-Role Inventory (BSRI), the Attitude Toward Women Scale (AWS), and several instruments constructed specifically for this study were administered to a national sample of individuals who had indicated that their primary professional involvement was in elementary, secondary, or university physical education. The response rate for the survey was 67%. Members from a wide range of ages and institutional positions were represented. The analysis of the results indicated a significant and positive relationship between AWS scores and attitudes towards the participation of females in various activities in coed physical education classes, average performance level expected for females in nontraditional sports activities, and the range of skill expected for females in such nontraditional activities. Androgynous and sex-typed men (BSRI) differed significantly on valuation of instrumental objectives. Significant differences were found as a function of both sex and BSRI category in the value placed on socio-emotional objectives. Based on these results, it was concluded that sex-role perceptions are related to attitudes physical educators have towards the participation of females, to objectives valued, and to expectations for performance. Further, the results suggest there is applicability of the recent reconceptualizations of sex-roles, particularly the androgyny concept, to physical education.

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April 7, 1978
1:45 pm

GAMES "VIOLENT" AND "NON-VIOLENT" PEOPLE PLAY. J. Royce, University of California, Berkeley.

Research evidence shows that the "life style" of a people is often reflected in their play activities. There exists a substantial relationship of type of game to religion (1), child training (2), and social-political systems (3). The present study was designed to compare a reputedly "Violent" society with a "Non-Violent" society in regards to the type of games played.

Two societies were carefully selected on the basis of historical, anthropological and judicial reports testifying to their extreme position on the Violent-Non-Violent continuum. The Madurese(island North of Java) were visited for fieldwork in 1972, while the Semai(Central Malaysia) were studied in 1977. Using Royce's "Guide to Notation of Game Observations" (4) it was possible to obtain a complete set of detailed descriptions of play activities in both cultures.

Placement of the collected play activities on a matrix according to the dominant aspects of Agôn (competition, combat, etc.), Alea (chance, Hazard), Mimicry (imitation), and Ilimx (euphoria, fear), showed clustering of the Madurese in the Competitive (combat dominant) corner, whereas the Semai occupied the Imitation (rather than Cooperative) sector.

Madurese are familiarized with combat (animal vs animal, man vs man, Kites) at an early age. They see themselves as fierce, honorbound. The Semai"s self-image includes a non-violent nature, traditionally they do not compete.

The type of games played in these societies was indicative of their attitude toward violent behavior: the Madurese compete, accept violence, the Semai do not compete, are non-violent in their play activities.

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2.Roberts,J.M., and Sutton-Smith,B., Child Training and Game Involvement, Ethnology 1:166-185,1962.
3.Roberts,J.M., and Sutton-Smith, Cross Cultural Correlates of Games of Chance, Behavour Science Notes, 3:131-144,1966.
4.Royce, J., Guide to the Notation of Game Observation, Anthropos, 68:604-610,1973

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April 7, 1978
2:00 pm

THE EFFECT OF PERSONALITY PREFERENCE ON THE PHYSICAL PERFORMANCE OF FRESHMAN COLLEGE MEN.* Robert E. Allen, Ronald A. Siders, Owen J. Holyoak, and Mary H. McCaulley. University of Florida

This study was designed to investigate the effects of the four basic personality preferences on twelve physical performance variables. The subjects selected for this study were 448 college freshman males attending the University of Florida. The personality preferences of the subjects were identified on the basis of Jungian theory and the results of the Myers-Briggs Personality Type Indicator. The four basic preference categories were: extroversion-introversion, sensing-intuition, thinking-feeling, and judging-perceptive. The personality data were provided by the Typology Laboratory at the University of Florida. The physical performance data were obtained from twelve standardized tests administered to each subject as a part of the University's general physical education program. Specific tests included: (a) dips, (b) pullups, (c) leg strength, (d) back strength, (e) left grip strength, (f) right grip strength, (g) lung volume, (h) standing broad jump, (i) shot put, (j) shuttle run, (k) twelve minute run, and (l) fifty yard swim. The data were analyzed using an ANOVA program to determine if physical performance differences existed between the personality preferences in each category. The .05 level of significance was selected for all comparisons. The results showed that extroverts scored significantly higher on only two of the twelve physical variables measrued (a and l). The thinking types scored significantly higher on two of the variables (a and b). No significant differences were found between the sensing and intuitive types or between the judging and perceptive types. It was concluded that personality preference appears to have little or no significant affect upon the physical parameters measured in this investigation.

*This study was supported, in part, by the College of Physical Education, Health, and Recreation at the University of Florida.

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April 7, 1978
2:15 pm

PERSONALITY TYPE AND PHYSICAL PERFORMANCE OF FRESHMAN COLLEGE WOMEN.* Owen J. Holyoak, Robert E. Allen, Ronald A. Siders, and Mary H. McCauliey. University of Florida

Six hundred college freshman women subjects were utilized to investigate the influence of the four basic personality preferences on ten performance variables related to physical and motor fitness. Personality preferences were identified on the basis of Jungian theory and the results of the Myers-Briggs Personality Type Indicator. The Typology Laboratory at the University of Florida provided the personality date related to the four basic preference categories: extroversion-introversion, sensing-intuition, thinking-feeling, and judging-perceptive. The fitness data were obtained from ten standardized tests administered to freshnam women enrolled in the University's general physical education program. Specific tests included (a) pushups, (b) situps, (c) flexed arm hang, (d) left grip strength, (e) right grip strength, (f) twelve minute run, (g) modified step test, (h) 50 yard dash, (i) shuttle run, and (j) vertical jump. The data were analyzed using an ANOVA program to determine if physical performance differences existed between the personality preferences in each category. The .05 level of significance was selected for all comparisions. The results showed that extroverts scored significantly higher on five of the ten physical variables measured (b, f, h, i, and j). The scores of the thinking types were significantly higher on two of the variables (e and j). Perceptives scored significantly higher on only one of the variables (h). No significant differences were found between the sensing and the intuitive types. It was concluded that extroversion appeared to have an influence on the physical parameters measured in this investigation. This conclusion could not be extended to include the other three personality preference catagories.

*This study was supported, in part, by the College of Physical Education, Health, and Recreation at the University of Florida.

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April 7, 1978
2:30 pm

THE FUNCTION OF WOMEN'S VALUES TOWARD PHYSICAL ACTIVITY ON INITIAL LEVELS AND CHANGES IN DISTANCE RUNNING PERFORMANCE.

Elizabeth Yeckel Brown, San Jacinto College; G. Robert Ward, University of Houston.

The purpose of this study was to examine the relationship between physical activity values on distance running performance. The Kenyon's Attitude Scale Toward Physical Activity and the 1.5 mile run were administered to sixty-nine college women during the third week of a body conditioning course. The 1.5 mile run was readministered ten weeks later. The body conditioning course included aerobic and overload training. The courses met three hours per week with two training durations which were either three one hour classes or two one hour and thirty minute classes per week. Multiple regression was used for data analysis. The results showed that the women's values toward physical activity were related to initial 1.5 mile run performance ($F(6,60) = 3.65$; $P < .01$). Step-down analysis showed that pursuit of vertigo was the only dimension related to initial run performance. The second regression model and final 1.5 mile performance were the dependent variables and initial 1.5 mile performance, two or three day class (dummy coded), and Kenyon's Attitude Scale Toward Physical Activity were the independent variables. The full Model was significant ($F(8,60) = 26.60$; $P < .01$). Step-down analysis was used to control for initial running status and days the class met. Both accounted for significant post test variance (F's $(1,60 = 191.61$ and 18.30, $P < .01$). The third step included the adding of the six Kenyon values. This was not significant ($F(6,60) = .44$; $P < .05$). This showed Kenyon's Attitude Scale Toward Physical Activity was related to the initial distance running performance, but not final levels when initial status and duration of training was controlled. This suggested that changes in running performance were not a function of ones values toward physical activity.

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April 7, 1978
2:45 pm

A TEST OF THE INDEPENDENCE OF THE RECALL AND RECOGNITION STATES OF MOTOR MEMORY. Richard B. Cobb, Syracuse University.

Whether one ascribes to a closed-loop theory and/or a schema theory of motor learning by necessity, response production and response learning are considered to be independent states. The purpose of this investigation was to determine if a delay of knowledge of results had differential effects on the recall and recognition states of motor memory. An additional purpose was to ascertain if a reduction in response produced feedback and the use of a secondary task altered either memory state. Sixty male subjects were randomly divided into two treatment groups and designated as immediate KR (5 second delay) and delayed KR (25 second delay). Phase I consisted of learning to move a slide 30.48 cm with follow through permitted in exactly 150 msec with KR provided after each trial. Phase II began after a short rest in which KR was withdrawn along with the manipulation of feedback states. Within each KR treatment three subgroups were defined as standard feedback, limited feedback and opposed feedback. Absolute error, variable error and constant error were used to measure recall. Statistical analysis revealed incongruent results depending upon what error measure was used. For example, when KR was withdrawn, the KR5LF group significantly regressed in accuracy, but this trend was not sustained over the no KR trials. When KR was withdrawn after it had been delayed, a significant change in the consistency of responding occurred. Both of these results contradict a schema interpretation of motor learning. The absolute difference between actual and estimated scores indicated that recognition was inhibited by a withdrawal of exteroceptive feedback while the delay of KR produced no differences between groups. Additional results and conclusions are discussed in terms of statistical artifacts and a conceptual interpretation of current theoretical notions.

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April 7, 1978
3:15 pm

THE FACTOR STRUCTURE OF MOTOR PERFORMANCE ABILITIES AND PERCEPTUAL MOTOR FUNCTIONS OF FOUR AND FIVE YEAR OLD PROJECT HEADSTART AND NON PROJECT HEADSTART CHILDREN; Reinhard R. Bergel, University of California Berkeley

The study was designed to determine the factor structure of motor abilities and perceptual motor functions of four and five year old children enrolled in Project Headstart and non Project Headstart preschools and to determine the factor structure similarities of these four groups. Motor abilities and perceptual motor functions were measured by a series of performance tests. Anthropometric measurements were taken, in order to obtain information on the physical growth of the children. The participants were four groups of equal size, 50 children in each of the four groups. The analytic stratagem included two Principal Component solutions (Incomplete Principal Components, Rao's Canonical Component) and Alpha Factor Analysis. These three initial solutions were rotated orthogonally and obliquely. The factors from each of the six solutions were compared according to the interpretation strategy of Harris and Harris (1971). Factor structure similarities of motor abilities of the four subject groups were assessed according to the method developed by Kaiser, Hunka, and Bianchini (1971). The result of the factor analyses disclosed a well defined factor structure of motor abilities and anthropometric measurements both in the Headstart and non Headstart children at both age levels. Six comparable common factors were isolated in all four groups tentatively identified as body fat, body size, power and gross motor coordination, upper extremity and shoulder girdle strength, fine motor coordination, and balance and coordination. Application of the Kaiser, Hunka, and Bianchini technique to quantify the similarity of the factor patterns disclosed that the basic components which underlie a major portion of the motor domain of Headstart and non Headstart are quite similar. The fact that the factor structures of the four groups were so similar suggests that the orientation of a movement or sports program for Headstart preschool children need not be materially different from that offered to non Headstart children. Concern should be given to equip the preschool child with the skills and abilities needed to function satisfactorily and consequently enjoy life time sports and other physical recreational skills.

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April 7, 1978
3:30 pm

CANONICAL RELATIONSHIPS OF PERCEPTUAL, PERCEPTUAL-MOTOR AND COGNITIVE BEHAVIORS IN YOUNG, NORMAL CHILDREN. David E. Belka, Miami University, Harriet G. Williams, The University of Toledo.

The purpose of this study was to investigate the nature and extent of the relationships among perceptual (PER), perceptual-motor (PM), and cognitive (COG) behaviors in young, normal children. An extensive battery of tests was used to assess domain behaviors for 61 pre-kindergarteners, 63 kindergarteners and for 65 first graders. PM behaviors were measured using Cashin's Motor Test, the Bender-Gestalt Test for Young Children, the Shape-O-Ball test, and the Frostig DTVP visual-motor subtest. PER behaviors were assessed with the DTVP figure-ground and position-in-space, subtests, the Wepman Auditory Discrimination test and six subtests of the ITPA. COG behaviors were measured by The Boehm Test of Basic Concepts (pre-kindergarteners), the Metropolitan Readiness Tests (kindergarteners), and the Reading Profiles Level 1 test and subtests four and five of the California Short-Form Test of Mental Maturity (first graders). Canonical correlation statistical analysis revealed significant relationships between: PM and PER behaviors at the pre-kindergarten ($Rc = .754$, $p < .05$) and kindergarten ($Rc = .735$, $p < .05$) but not at the 1st grade ($Rc = .722$, $p > .05$); PM and COG behaviors at kindergarten ($Rc = .728$, $p < .0001$); PER and COG behaviors at pre-kindergarten ($Rc = .795$, $p < .0001$), kindergarten ($Rc = .843$, $p < .001$; and for 1st $Rc = .787$, $p < .001$) levels. In agreement with the literature, the magnitude of relationships and amount of shared variance diminishes with age from kindergarten to first grade. Abilities tend to become more specific during the time except for the cognitive-perceptual behaviors. A number of findings regarding subdomains of behaviors resulted from the data analysis. Visual behaviors are more important to PM behaviors, and especially fine motor behaviors, than are the auditory behaviors. Fine PM behaviors are more important for describing relationships than are gross motor behaviors. Auditory behaviors are more important for describing COG relationships than are visual behaviors. The single task which is the most consistent and important descriptor of relationships is the Bender fine motor task.

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April 7, 1978
3:45 pm

THE EFFECTS OF CHROMATIC TARGETS ON THROWING FOR SUBJECTS REFERRED FOR LEARNING DISABILITY. Bobby Lee Eason and Theresa L. Smith, University of New Orleans

The purpose of the study was to determine the effects of chromatic and achromatic targets on learning and performing a throwing task for subjects referred for learning disability. Learning was operationally defined as throwing accuracy as measured during practice over a five week period. Performance was defined as throwing accuracy after learning had stabilized. Subjects were 24 boys referred to the University of New Orleans Perceptual Motor Development Center, randomly divided into chromatic and achromatic treatment groups. The independent variable was a bean bag throwing task at achromatic or chromatic targets. Data for each treatment condition were collected weekly over a five week period for a total of five trials. After the fifth trial, each subject immediately performed a sixth trial on the opposite target. Throughout the study, the subjects were naive of the other treatment condition. A two factor mixed ANOVA was used to analyze learning over the first five trials. A significant F ratio of 2.91 (.05) for trials indicated that learning occurred. There was no difference between learning treatment conditions or trials by treatment interaction. A randomized ANOVA was used to measure performance on the sixth trial. An F value of 7.16 (.01) was found between the two groups. The results indicate that when subjects were aware of chromatic and achromatic target alternatives, chromatic targets facilitated performance. However, when subjects were naive of target differences, the motivation to perform a novel task with either chromatic or achromatic targets was of sufficient strength to result in learning and to sustain performance.

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April 7, 1978
4:00 pm

TOWARD A THEORY OF REMINISCENCE IN THE AGED.

Kenneth Lersten, Purdue University.

The aim of this study was to produce speculation and theory for future research rather than test an hypothesis. Reminiscence in older ages was the focus. Data from previous studies and from a preliminary study were utilized. A rather common design using the pursuit rotor at 45 RPM collected data from massed and distributed practice with young (N=33, $\bar{x}$ 19 years) and older (N=43, $\bar{x}$ 65 years) subjects. Significant differences favored young subjects for learning overall and for reminiscence under the massed condition. Speculation about the effects of massing in older subjects has taken the form of the greater buildup of sIR in the inhibition theory framework. Other theoretical possibilities exist: physiological fatigue that does not dissipate during rest; perceptual after effect that floods neural channels and lowered arousal level. A variety of testable hypotheses can be formulated in this little researched area.

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April 7, 1978
4:15 pm

TRENDS IN SELECTED MYOELECTRIC VARIABLES ASSOCIATED WITH LEARNING A NOVEL MOTOR TASK

Peter McGrain, Assistant Professor, San Diego State University

The purpose of this study was to determine the selected myoelectric changes in forty-one college aged males during practice in a novel motor task. Integrated electromyographic (Iemg) activity of the Biceps Femoris, Semitendinosus, Rectus Femoris, and Vastus Medialis was monitored using surface electrodes. The training program consisted of practicing a task in which a four-wheeled carriage was propelled along a level aluminum track by a knee extension movement. Performance in the task was demonstrated by the subject's ability to propel the carriage at a specified velocity. Each of six sets of myoelectric variables was analyzed from trials 1, 2, 6, 15, and 21. A One-Sample Hotelling's T^2 Test was used to determine if significant changes occurred across trials for each set of myoelectric variables. If a set of variables demonstrated significant change over trials, then a trend analysis was performed on each muscle. The results revealed the following: (1) mean performance scores demonstrated that a significant amount of learning took place; (2) performance scores were best fit using a fourth degree quartic curve; (3) two myoelectric timing variables demonstrated no trends; (4) the knee flexors had linear trends and the knee extensors had cubic trends on the variable maximum Iemg amplitude; and (5) the knee extensors had cubic trends, the Biceps Femoris had a linear trend, and the Semitendinosus had no trend on two myoelectric area variables. It was concluded that when myotemporal changes are not evident over practice, changes in maximum Iemg amplitude of muscles will be responsible for increasing performance proficiency.

The author wished to acknowledge the following individuals for their time and energy donated during the study.

David L. Kelly, Andrew Dainis, and Donald Hobart.

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April 7, 1978
4:30 pm

THE EFFECTS OF SELECTED RECALL STRATEGIES UPON REPRODUCTION CUES IN MOTOR SHORT-TERM MEMORY. Roger W. Simmons, San Diego State University; Lorrie Semler, Montclair State College.

The study investigated whether the use of two types of recall strategies used in conjunction with specific reproduction cues leads to differential recall error. Female and male subjects (N=30) were taken on a volunteer basis and randomly assigned to one of two conditions. One group of subjects used a counting recall strategy to encode and subsequently recall various movement lengths. The second group utilized a strategy of imagery to accomplish the same task. The within-subject variables for both groups were the type of reproduction cue (end location and movement distance) and movement length (short, medium and long). Movements were made by the subject in a right to left direction by moving a cursor along a linear rod supported on a wooden base board. A blindfold precluded the use of vision and white noise delivered to the subject through ear phones prevented auditory cues from the apparatus being heard. The experimenter used a microphone to present instructions through the same headphones. Analysis of absolute, algebraic and variable error indicated that no statistically significant differences existed between the recall accuracy of subjects using imagery or counting recall strategies. Previous research has indicated a possible relationship between the type of recall strategy used and specific reproduction cues. An interaction of this nature was not indicated by the present experiment. The results of the study were discussed in terms of procedural problems involved with trying to control variables such as imagery and some of the alternative techniques available to subjects to encode memory information.

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April 7, 1978
4:45 pm

ELECTROMYOGRAPHIC ACTIVITY AND FREQUENCY RESPONSES RELATED TO MOTOR CONTROL PARAMETERS IN A ONE-DIMENSIONAL MOVEMENT TASK.

R. Engelhorn and J. Patterson, University of Illinois.

The purpose of this research was to investigate the relative contribution of distance, position, force and velocity cues in learning a movement displacement or a location. The dependent variables were the electromyographic (EMG) parameters of frequency and activity. The task required a simple wrist flexion to move a weighted lever rotating in the vertical plane. Continuous auditory feedback was available during learning trials for velocity and position or distance information. Velocity feedback was provided on each trial until the movement distance or position had been achieved, after which the feedback related to position or distance. Twenty-nine subjects were assigned to one of four groups. Two groups learned a distance while the other two learned a position. Within each of the tasks one group had load, velocity, and movement starting position varied from trial to trial. Bipolar surface EMG activity was recorded from the forearm wrist flexors during the required movements. EMG and movement data were recorded on analog magnetic tape, subsequently digitized at 1000 samples per second and subjected to computer analysis. EMG data were quantified using the root mean square (RMS) as a measure of muscular activity and spectral analysis estimates as a measure of the frequency components reflecting differential motor unit involvement in the control of the movement. Results of analyses of variance indicate that frequency and activity levels are related to the intended movement distance and initial velocity. Groups learning a distance showed a lower mean frequency and variance and a lower activity level than subjects learning a position. The results suggest that spatial and distance information are abstractions of muscular force and timing components, and it is these parameters which are important in movement control.

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April 7, 1978
5:00 pm

RESPONSE ACCURACY AND ERROR CORRECTIONS IN AIMING MOVEMENTS. Les G. Carlton, University of Illinois.

The present experiment examined movement patterns produced by subjects when asked to make discrete movements to a target. The movement patterns were used to determine the accuracy of the initial movement command and to determine the extent to which corrections are present in discrete aiming movements. Subjects were required to make discrete movements to a target 1.27 cm in diameter and 15.24 cm from the starting position in a right to left direction. Movement patterns were determined with the use of a high speed cinematorgraphy system. The film recorded the position of a hand held stylus at a rate of 150 frames per second which gave the location of the stylus every 6.67 msec. From this information data was available from which the movement displacement, velocity, and acceleration was determine for the horizontal (X) and vertical (Y) axis separately, as well as for the resultant function. The results indicated that the initial movement command was approximately 94% accurate when examined along the X axis. When movement accuracy was obtained for the actual distance the stylus moved as represented by the resultant function, initial movements tended to be somewhat less accurate. Velocity and acceleration patterns were examined to locate the presence of any movement corrections which may have taken place during the course of the aiming movement. Examining the movement patterns along the X and Y axis separately did not yield conclusive results. The resultant movement patterns, however, clearly demonstrated movement corrections which were represented as movement acceleration initiated while the stylus was near the target. The present results tend to support a discrete feedback interpretation of Fitts' law and brings out the point that movement accuracy may vary depending on whether it is determined along one or two dimensions.

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April 7, 1978
5:15 pm

SEQUENTIAL DEVELOPMENT OF THE MOVEMENT PATTERN SLIDING. Beverly E. Mackes, University of Illinois at Urbana-Champaign.

The purpose of this study was to determine if there is a sequence of emergence of the elements and deviations, and a configuration of relationships between the number and degree of deviations and the number and degree of elements present in the Movement Pattern Sliding. Filmed performances of 55 children, 4 years to 9 years 11 months, executing the three sub patterns, Forward, Side, and Slide on Floor, of the Movement Pattern Sliding for the right and left leg performances were evaluated by three raters utilizing a modified checklist to identify elements and deviations present. Polynomial regression analyses for linear, quadratic, and cubic trends indicated that all the elements within and among the sub patterns developed in significant but varying orders. However, the deviations developed sporadically with only 16 out of 47 deviations signifying any significant developmental trends. Two way ANOVAs and Tukey's HSD test for ability groups within each sub pattern substantiated a sequence of emergence for each of the three sub patterns. The common sequence of emergence for the sub patterns was the element Maintains A Straight Path emerged first, Leg Positioning Action and Leg Timing Action emerged second, Uses Effective Propulsion, True Actual Slide, and Fluidity of Performance emerged third, Body Action and Arm Action emerged fourth, and Maintains Body Position and Arms Used For Balance emerged last. When the sub patterns were compared, the development differed for the elements Uses Effective Propulsion, Leg Positioning Action, and Arms Used For Balance. In conclusion, there was a sequence of emergence of the elements in the Movement Pattern Sliding. There was no configuration relationship between the number and degree of deviations and the number and degree of elements present in the three sub patterns of the Movement Pattern Sliding.

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April 7, 1978
5:30 pm

THE EFFECT OF VARYING LENGTHS OF STRIDE ON PERFORMANCE DURING SUBMAXIMAL TREADMILL STRESS TESTING. Sharon Lee Shields, George Peabody College for Teachers; H. Leon Garrett, University of Kentucky.

The purpose of this study was to determine the effect of four stride patterns on an individual's performance of a submaximal exercise stress test. Physiological parameters measured in this study were heart rate and oxygen consumption. Test termination time served as the basis for assessment of performance. Eighteen male and 18 female volunteers between the ages of 18 and 40 years participated in this study. The workout consisted of walking on a motor driven treadmill at a speed of 3.39 miles per hour. The grade of the treadmill was fixed at zero for the first minute of the test and was elevated one degree per minute until the subject reached 85% of his or her age adjusted heart rate. Treatment one involved the subject performing a submaximal exercise stress test using natural, comfortable, and instinctive strides. A stride length equal to 60% of the subject's leg length (as measured from the top of the iliac crest to the sole of the shoe worn in the experiment) was used by the subject when performing the stress test in treatment two. A stride length equal to 80% of the subject's leg length was used by the subject when performing the stress test in treatment four. Data were analyzed with the analysis of variance for repeated measures. Results indicated a natural, comfortable, and instinctive stride produces a significantly greater performance time during a submaximal treadmill stress test than does a stride length equal to 60% of the subject's total leg length. No significant difference existed in stress test termination time between using an instinctive stride or a stride length equal to 70% of the subject's total leg length. A stride length equal to 70% of the subject's total leg length produces a significantly greater performance time than does a stride length equal to 60% of the subject's total leg length. A stride length equal to 80% of the subject's total leg length is significantly more efficient than a normal, comfortable, and instinctive stride. A stride length equal to 80% of the subject's total leg length is significant when a subject uses a stride length equal to 80% of total leg length than when the subject uses a stride length equal to 70% of the subject's total leg length.

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April 8, 1978
9:00-12:00 pm
Poster #1

RELATIONSHIP BETWEEN MAXIMAL OXYGEN INTAKE AND SELECTED FITNESS VARIABLES IN ADULT MEN. Aix B. Harrison, Oklahoma State University; Max Oldham, Southern Missouri College.

Subjects for this study were 85 male volunteers from the Oklahoma State University Faculty ranging in age from 25-58 years with a mean of 40.3 years. Each subject was given a physical fitness evaluation including resting cardiovascular measures, anthropometric measures, pulmonary function and a treadmill test to predict maximal oxygen intake capacity. The chi square and coefficient of contingency were used to determine the extent of the relationship between oxygen intake and the other variables which had been dichotomized. There were significant relationships between maximal oxygen intake and the following: Schneider Index, R wave amplitude of the resting ECG, rest/work ratio of the resting ECG, and the 5 minute recovery heart rate following the end of the treadmill test. A significant difference was found from a chi square statistic on maximal oxygen intake when the subjects were grouped into three exercise intensity categories. It is interesting to note that all of the strong relationships occured between maximal oxygen intake and cardiovascular measures while there were no strong relationships with pulmonary function or anthropometric measures. The data tended to support the idea that there is a strong relationship between aerobic capacity and cardiovascular fitness, and that the level of physical activity is strongly related to maximal oxygen intake capacity.

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April 8, 1978
9:00-12:00 pm
Poster #2

MUSCLE COORDINATION AND TEMPORAL FIRING SEQUENCES WITHIN A PAIRED MUSCLE GROUP. Geraldine K. Lofthus and Jay A. Lowy, University of California at Berkeley.

The purpose of this study was to assess the relationship between paired agonist/antagonist muscle firing times and accompanying time to peak EMG amplitudes with a 75 degree ballistic right forearm flexion task during treatment conditions of A) no external limb resistance, B) 3.1 kg., and C) 9.8 kg. of pre-movement limb resistance. In addition, Total Reaction Time and Movement Time values were compared relative to the treatment conditions. Electromyographs were recorded via surface electrodes placed over motor points of the medial head of the biceps brachii and lateral head of the triceps brachii. The subject's arm was supported by a specially constructed apparatus. The onset of the reaction time task was signalled by the flash of a visual stimulus and ended once subjects began forearm flexion and disengaged a microswitch situated on the table at wrist level. Disengagement of the microswitch also constituted the onset of Movement Time which was completed once the forelimb passed beyond a photo electric cell situated at a 90 degree angle to the subject's elbow. External limb resistance was controlled by a variable power supply which energized an electromagnet. Twelve male subjects practiced the flexion task for three days until criterion measures stabilized. Following five control measures on each of the next two days, 10 trials each of treatments A,B,C appearing in random order were administered. Results indicated that as external limb resistance increased (from A to B to C), Movement Time decreased by 30 msec., Total Reaction Time increased by 52 msec., while biceps latency remained unchanged. There were significant ($p < .05$) increases in triceps latency, biceps and triceps time to peak EMG amplitude only with respect to the greatest external resistance (condition C). It is speculated that coordination may be defined in terms of the temporal firing sequences within a paired muscle group.

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April 8, 1978
9:00-12:00 pm
Poster #3

A SIMPLIFIED METHOD FOR THE ENZYMATIC MEASUREMENT OF ATP AND CP IN HEART MUSCLE. H.W. Bonner, C.K. Buffington, C.E. Riggs, Jr (Environmental Stress Inst., Santa Barbara), R.P. Farrar, University of Texas, Austin

We have developed a simplified and accurate modification of the Fawaz method for the enzymatic measurement of adenosine triphosphate (ATP) and creatine phosphate (CP) in heart muscle. To determine the ATP content of the muscle the enzyme 3-phosphoglycerate kinase (PGK) is used to catalyze the first reaction: (1) ATP + 3 phosphoglycerate $\xrightarrow{PGK}$ ADP + 1,3 Diphosphoglycerate. The enzyme glyceraldehyde-3-phosphate dehydrogenase (GPDH) is used to catalyze the second reaction: (2) 1,3 DPG + NADH $\xrightarrow{GPDH}$ 3 Phosphoglyceraldehyde + NAD. The spectrophotometric measurement of a decrease in absorbance at 340 nm (A_{340}), resulting from NADH being oxidized to NAD, is a measure of the ATP present in the tissue. After the measurement of ATP concentration in the heart, the CP content is determined by adding ADP and the enzyme Creatine Phosphokinase (CPK) to catalyze the following reaction: (3) CP + ADP $\xrightarrow{CPK}$ ATP + Creatine. The ATP formed in reaction (3) initiates reactions (1) and (2) so that the second decrease in A_{340}, as NADH is oxidized to NAD, is proportional to the CP content in the tissue. The reliability of the ATP and CP measurement was established by using the hearts of 18 male Wistar rats frozen *in situ* with specially designed tongs pre-cooled in liquid nitrogen, and pulverized using a specially designed stainless-steel mortar and pestle. (Photographs and specifications of these two pieces will be displayed). The test-retest reliability for these measurements was $r_{11} = 0.99$ for both ATP and CP. The sensitivity of the assays was determined by measuring the ATP and CP contents of hearts from control rats (N=8) and of animals (N=10) administered ± 0.1 mg subcutaneous injection of Isoproterenol-HCl (ISO), a potent synthetic catecholamine known to reduce the high energy phosphate levels in the heart. The ATP and CP levels of the control hearts were 5.45 (± 0.70) for ATP and 2.29 (± 1.00) um/g for CP following ISO injection ($p<0.0001$). These values are consistent with those reported in the literature. While the methodology and instrumentation described here were used for the determination of ATP and CP in heart muscle, these procedures are also applicable to skeletal muscle and other mammalian tissue. This work was funded by an NIH-BSRG Grant.

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April 8, 1978
9:00-12:00 pm
Poster #4

BODY COMPOSITION OF COLLEGE FOOTBALL PLAYERS AND WOMEN ATHLETES.

Robert N. Girandol., University of Southern California.

Body composition measures were made on 94 male football players and 74 female athletes, representing six sports all from the University of Southern California (USC). The average height, weight and % fat of the football players was 186.4 cm, 97.78 kg and 13.5%. These values were quite similar to those reported for professional football players. The leanest players were the wide receivers (8.7%) and defensive backs (9.6%) while the fattest were the offensive linemen (19.0%). Players were ranked on ability at their respective positions by the coaches. Rank order correlations between ability and leanness ranged from rho = .51 to .75 for linebackers, defensive backs, offensive and defensive linemen. The female athletes averaged 166.3 cm, 60.46 kg and 20.0%, for height, weight and body fat, respectively. Of the six groups, the leanest subjects were the gymnasts (18.9% fat) and volleyball players (17.0% fat - 1976 national champions) and the fattest subjects were the swimmers (22.7% fat). The tallest and heaviest subjects were the basketball players. Rank order correlations were computed between the coaches' evaluation of the players' ability and leanness. Significant correlations (rho = .62 to .83) were found for volleyball, tennis, swimming and track and field. It was concluded that measures of body composition can be used effectively in helping predict success of college football players and female athletes in certain sports.

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April 8, 1978
9:00-12:00 pm
Poster #5

AEROBIC POWER, HEART RATE AND PERCEIVED EXERTION DURING TETHERED SWIMMING IN MALE AND FEMALE AGE-GROUP SWIMMERS. Edmund J. Burke, Lawrence C. Jones, Thomas J. Meade Jr., Ithaca College.

The purposes of this study were: 1) to describe certain physiological, anthropometric and psychological characteristics of male and female age-group swimmers, and 2) to compare the validity of submaximal heart rate (HR) and ratings of perceived exertion (RPE) in estimating oxygen consumption. Eleven females, $\bar{X}$ age, 14.64 years who had been in training for approximately 5.7 years and nine males, $\bar{X}$ age, 15.1 years who had been in training for approximately 6.3 years were tested. At the time of testing the females were swimming approximately 5600 yards per day while the males were swimming about 7000 yards. Each subject was administered two progressive, intermittent tests of $\dot{V}O_2$ max within a one week period with the use of a tethered swimming apparatus. HR was monitored for 10 seconds after each of the work loads needed to elicit $\dot{V}O_2$ max. RPE was monitored following each work load utilizing the Borg 6-20 scale. Grand mean anthropometric and physiological measures for females and males, respectively, were: height, 166.93 and 169.93 cm; weight, 58.24 and 61.57 kg; estimated percent fat, 20.10 and 16.22; $\dot{V}_E$ max BTPS, 78.33 and 87.86 $l \cdot min$; $\dot{V}O_2$ max, 2.96 and 3.48 $l \cdot min^{-1}$; VO_2 max, 50.98 and 56.39 $ml/kg \cdot min^{-1}$; HR max, 171 and 177. The test was reliable as evidenced by the intraclass correlations across subjects for $\dot{V}_E$ max, R=.95; $\dot{V}O_2$ max, $l \cdot min^{-1}$, R=.98; and $\dot{V}O_2$ max $ml/kg \cdot min^{-1}$, R=.94. The method chosen to compare the validity of HR and RPE was the following: 3 submaximal work loads were randomly chosen from each of the 40 $\dot{V}O_2$ max tests thus setting up a trials (work loads) X days X sex experimental design. ANCOVA was employed with arcsin transformed percent of $\dot{V}O_2$ max (P) used as the criterion variable while HR and RPE were used as covariates. Both HR and RPE had highly significant relationships with P across trials. While not significantly greater (P>.05), the covariance between RPE and P was larger than HR and P. These relationships held constant for days and between sexes. It was concluded that these highly aerobically fit age-group swimmers had the ability to accurately assess the physiological cost of tethered swimming through use of HR or RPE. Furthermore, RPE was as good or better than HR in estimating submaximal $\dot{V}O_2$.

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April 8, 1978
9:00-12:00 pm
Poster #6

THE AEROBIC COST OF ISOKINETIC SLOW AND FAST SPEED CIRCUIT STRENGTH TRAINING PROGRAMS. L.R. Gettman, Institute for Aerobics Research, Dallas, Texas.

The purpose of this study was to determine the oxygen requirements for circuit strength training (CST) workouts using isokinetic devices (Cybex). Five males ($\bar{X}$ age = 27.8 yrs) were tested at slow (60 deg/sec) and fast (120 deg/sec) speeds of movement on seven isokinetic exercises. Subjects (Ss) completed three circuits of the seven exercises with 12 reps/exercise and 30 sec rest between each station. Slow and fast speed workouts were assigned randomly and performed one week apart. Repeated workouts at the same speed were performed by four Ss. Oxygen uptake ($\dot{V}O_2$), heart rates (HR), and total integrated work for each exercise and recovery bout were monitored continuously on semi-automated systems throughout the entire circuit. The slow and fast speed circuits did not differ in average $\dot{V}O_2$ (1.91 vs 1.98 L/min, respectively), ventilation (77.9 vs 81.3 L/min, BTPS), respiratory quotient (1.06 vs 1.08), serum peak lactic acid concentration (143.4 vs 143.1 mg/100 ml), work HR (151 vs 150 beats/min) or recovery HR (133 vs 134 beats/min). However, the slow speed circuit had significantly greater values for average work per exercise (3.93 vs 2.64 ft.lbs x 1000), total circuit time (25.64 vs 19.14 min) and total gross energy cost (244 vs 189 kcal). The average $\dot{V}O_2$, work per exercise, and work HR had acceptable levels of repeatability (r = 0.96, 0.88, and 0.94, respectively). The average oxygen cost and work HR for both circuits represented 49 and 69% of the Ss $\dot{V}O_2$ max and HR max range, respecively. It was concluded that the rates of aerobic energy expenditure for the slow and fast speed circuits (9.6 and 9.9 kcal/min, respectively) appear to be sufficient to stimulate cardiorespiratory (CR) function; however, the duration of CST programs would have to be extended beyond 25 min (slow speed CST) in order to produce a so-called CR "training effect."

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April 8, 1978
9:00-12:00 pm
Poster #7

37

CAN BREATHING 75% OXYGEN DURING INTERMITTENT RECOVERY PERIODS MAINTAIN PREVIOUS EXERCISE PERFORMANCE LEVELS IN MEN? R.O. Ruhling, U of Utah; J.R. Timmer, Calvin College

The purpose of this study was to determine if breathing oxygen enriched air during recovery periods, between submaximal exercise periods, sustained previous exercise performance levels more effectively and more efficiently (delayed fatigue) than breathing compressed room air during similar periods. Eight male volunteers (31.4 $\pm$ 6.6 yr, mean $\pm$ SD) breathed either oxygen enriched air (75% O_2) or compressed room air (21% O_2)during three minute intermittent recovery periods between three repeated three minute exercise periods. A double-blind protocol was utilized in the administration of the gases. The exercise periods consisted of quantitative measures of muscular strength (total kg registered from four grip strength attempts taken on a hand dynamometer, total kg registered from four attempts at static elbow flexion strength measured at 90° with a cable tensiometer, total kg registered from four attempts at static knee extension strength measured at 130° with a cable tensiometer), muscular power (total cm recorded from seven trials at vertical jumping, total cm recorded from six trials at standing long jumping), and muscular endurance (first minute on a bicycle ergometer at 900 kpm $\cdot$ min^{-1}, second minute on a bicycle ergometer at 1200 kpm $\cdot$ min^{-1}, third minute of bent-knee sit-ups at a rate of 30 $\cdot$ min^{-1}). During the intermittent recovery periods, heart rate, oxygen consumption, carbon dioxide production, and minute ventilation were monitored minute-by-minute. Results indicated that these muscular activity(strength, power, endurance) performance levels were not significantly($p > .05$)enhanced by breathing 75% O_2 during three intermittent recovery periods. Although some increases were observed in all activities, the greatest increases appeared in the muscular endurance activities. However, during the recovery periods, oxygen consumptions were increased($p < .05$) when breathing 75% O_2. Variable results were obtained on heart rate, carbon dioxide production and minute ventilation, measured during recoveries, none of which apparently affected the exercise results. It was therefore concluded that breathing 75% O_2 during intermittent recovery periods had no effect on succeeding exercise performance levels in these men.

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April 8, 1978
9:00-12:00 pm
Poster #8

MULTIVARIATE ANALYSIS OF PHYSIOLOGICAL DIFFERENCES BETWEEN GOOD AND ELITE WORLD CLASS DISTANCE RUNNERS. M. L. Pollock, University of Wisconsin Medical School; A. S. Jackson, University of Houston; and R. R. Pate, University of South Carolina.

The purpose of this investigation was to evaluate and quantify physiological differences among groups of distance runners. "Were good and elite distance runners physiologically different?" Were elite marathon and middle-long distance runners physiologically different?" The subjects for this investigation included twenty elite distance runners; eight marathon, and twelve middle-long distance, and eight good runners. Working capacity and cardiorespiratory function were determined by submaximal and maximal treadmill tests, and body composition by hydrostatic weighing. The multiple dependent variables studied were maximum oxygen uptake ($\dot{V}O_2$ max), $\dot{V}O_2$ submax, lactic acid (LA) submax, lean body weight, and fat weight. MANOVA showed that the good runners differed from the elite runners ($F=10.9$; $df=5,21$; $p < 0.0001$) and the elite marathon differed from the elite middle-long distance runners ($F=2.84$; $df=5,21$; $p < 0.04$). The analysis showed two significant discriminant functions which separated the three groups. The first was a general physiological efficiency factor that separated the good and elite runners. The second separated the elite marathon and middle-long distance groups. The second function showed that the marathon runners had a lower LA submax values. The middle-long distance runners had higher $\dot{V}O_2$ max values. Classification analysis was used to evaluate the accuracy of the discriminant analysis; 80% of the elite runners were correctly classified as marathon or middle-long distance runners. The discriminant functions were used to develop a multivariate scaling model for evaluating distance runners. Two premier runners, one marathoner (Shorter) and one middle-long distance runner (Prefontaine) were found to be at the extremes of the multivariate scale. The data showed that the discriminant functions provided a valid model for evaluating distance runners.

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April 8, 1978
9:00-12:00 pm
Poster #9

CARDIORESPIRATORY ALTERATIONS IN 9-TO-11 YEAR OLD CHILDREN FOLLOWING A SEASON OF COMPETITIVE SWIMMING. Paul Vaccaro, University of Maryland; David H. Clarke, University of Maryland.

The purpose of this study was to describe cardiorespiratory alterations in a group of previously untrained 9-to-11 year old children resulting from seven months of swimming training. Fifteen members of a competitive swim team served as subjects. A non-training group of fifteen children of similar age, height and weight were studied at the same time. All measurements were made on three separate days, before and after the training period. On Experimental Day One the subjects were measured for VC, $FEV_{1.0,}$ and MVV. On Experimental Day Two they were measured for $\dot{P}WC_{170}$ and on Experimental Day Three height (cm), weight (kg), $\dot{V}_E$ max (L), $\dot{V}_{02}$ max (ml/kg•min) and H.R. max were determined. Results of the analyses indicated that: (1) the mean $\dot{P}WC_{170}$ change in the trained children (+80.00 kgm/min) was significantly greater than that in the reference group (+30.00 kgm/min) ($P < .05$); (2) the mean $\dot{V}_{02}$ max change in the experimental group (+8.11 ml/kg•min) was significantly greater than that in reference group (+2.21 ml/kg•min) ($P < .01$); and the mean changes in VC, $FEV_{1.0,}$ MVV, $\dot{V}_E$ max, and HR max were not greater than one would expect to see in normal children of similar age and body dimensions ($P > .05$).

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April 8, 1978
9:00-12:00 pm
Poster #10

40

THE PREDICTIVE VALUE OF THE T WAVE IN SPORTS PERFORMANCE.

Mike Bobo, Texas Tech University.

Resting EKG recordings were taken weekly on 12 male varsity swimmers from Texas Tech University. The deviations of the T wave above or below the isoelectric line were recorded for each swimmer as well as the weekly and yearly yardage totals swam and competitive swimming event times. Previous studies have shown depressed and inverted T waves in healthy individuals as a result of physical exertion and training. The T wave has also been used to predict physical performance, with a heightened peaked T wave being associated with successful performance and a lowered rounded and/or inverted T wave being correlated with poor performance. These abnormal T wave configurations, resembling many forms of myocardial impairment, have been found to be an isolated event not prohibiting the athlete from participation. Analysis of the data utilized a simple linear regression technique and t values to test the null hypothesis that the slope of the regression line equalled zero. Results revealed no significant change in the amplitude of the T wave as a result of the physical stress of a season of competitive collegiate swimming, and failed to show that the T wave could be used for predictive purposes.

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April 8, 1978
9:00 am-12:00 pm
Poster #11

41

THE RELATION OF CORONARY-PRONE BEHAVIOR PATTERNS TO PLASMA LIPIDS AND LIPOPROTEINS IN COLLEGE FRESHMEN. David E. Cundiff, James A. Schwane, Gary Dailey, Oral Roberts University.

Statement of the Problem. Research has demonstrated that in middle-aged adults, the commonly accepted risk factors of hypercholesterolemia, hypertension, smoking, physical inactivity, etc. are influenced by psychosocial variables through overt behavior practices and internal psychophysiologic mechanisms. This study investigated the relationship between behavior pattern and plasma lipids in college freshmen. Methodology. Freshmen students enrolled at ORU in the fall, 1976 were given Form N of the Jenkins Activity Survey (JAS) during a physical education class required of all new students. Freshmen who were 19 years old or younger were divided into two groups on the bases of JAS scores: (1) Type A, JAS score of 1 SD or more above $\bar{X}$; (2) Type B, JAS score of 1 SD or more below $\bar{X}$. Plasma concentrations of total cholesterol, triglycerides and high density lipoprotein cholesterol (HDL) were determined on 12-hour fasting samples by the lipid Research Center in Oklahoma City. Lipid levels between students with Type A and Type B behavior patterns were compared by means of independent t tests.

		TYPE A			TYPE B				
LIPID	SUBJECTS	N	X	SD	N	X	SD	t	P
CHOL.	MALES	13	156.4	$\pm$19.2	47	141.5	$\pm$ 21.9	2.22	<.05
mg%	FEMALES	33	163.6	$\pm$27.2	57	153.9	$\pm$ 23.5	1.78	<.10
LDL	MALES	13	95.9	$\pm$14.6	47	81.5	$\pm$ 21.3	2.27	<.05

Results. Of 191 freshmen who were classified either Type A or Type B (33% of freshman aged 19 and under) lipid data were available on 46 Type As (13 males and 33 females) and 104 Type Bs (47 males and 57 females). The data are tabled above. Type A freshmen males ($P < .05$) and females ($P < .10$) had higher total cholesterol than Type Bs while Type A males had higher LDL Cholesterol ($P < .05$). No statistically significant difference existed in males or females between Type A and Type B in triglyceride concentration, HDL cholesterol or in LDL cholesterol in females. Conclusions: Results of this study indicate that behavior pattern may influence plasma lipids and lipoproteins in college freshmen which supports previous research on middle-aged adults. Cholesterol values (male and female) and LDL cholesterol (males) were higher in freshmen with Type A behavior patterns which are considered an undesirable trend.

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April 8, 1978
9:00-12:00 pm
Poster #12

RELATIONSHIPS AMONG CARDIORESPIRATORY FITNESS, REGULAR PHYSICAL ACTIVITY AND PLASMA LIPIDS IN YOUNG ADULTS. James A. Schwane, David E. Cundiff, Oral Roberts University.

A possible relationship exists between cardiorespiratory (CR) fitness and coronary disease risk via a relation between CR fitness and/or level of regular physical activity and certain blood lipids. The extent of this latter relationship was studied in a sample of young adults (67 males and 85 females; $\bar{X}$ age = 18.8 yr) by investigating the interrelationships among total plasma cholesterol (TC), HDL- (quantified) and LDL- (estimated) cholesterol, plasma triglycerides (TG), skinfold estimate of % fat, aerobic capacity (AC) estimated from voluntary maximum performance on a standardized treadmill test, and level of regular physical activity as indicated by aerobic points (AP) and by walking or jogging mileage (M) accumulated over approximately 10 weeks. No strong correlation in either males or females was detected between either AC or the activity measures and any of the blood lipid parameters:

	AC		AP		M	
	males	females	males	females	males	females
TC	- .05	.00	- .06	.11	- .19	.12
TG	- .44	- .22	- .15	- .11	- .18	- .11
HDL	.27	.27	.04	.14	.07	.11
LDL	.00	- .07	--	--	--	--
HDL/TC	.28	.19	--	--	--	--
HDL/LDL	.09	.12	--	--	--	--

Similarly, no strong correlation existed between % fat and any of the plasma lipid variables. Multiple regression equations with AC and % fat as independent variables did not appreciably increase predictability of the various lipid measures. Females demonstrated a significantly higher HDL ($\bar{X}$ = 55.6) than males ($\bar{X}$ = 44.6), which is consistent with findings in older populations. It appears that the plasma lipids investigated here have little relationship with CR fitness or physical activity level, at least over the range of age, fitness, and activity of this sample, although the direction of most correlations is consistent with such a relationship.

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April 8, 1978
9:00-12:00 pm
Poster #13

EXERCISE RECOVERY, LACTATE REMOVAL, AND SUBSEQUENT HIGH INTENSITY EXERCISE PERFORMANCE. Arthur Weltman, Bryant Stamford, University of Louisville; Robert J. Moffatt, Victor Katch, University of Michigan.

In order to examine the effects of different recoveries from high intensity short duration exercise on lactate removal and subsequent performance, 11 subjects completed 8 experimental sessions. Each subject completed an initial all our pedalling task against 5.5 kg resistance (Monark bicycle ergometer) for one min followed by a randomly assigned recovery pattern and a repeat of the all out exercise task. The main effects examined were active (1.0 kg, 60 rpm) vs. passive recovery, inhalation of oxygen vs. room air during recovery, and 10 vs. 20 min duration of recovery. Pedal revolutions were analyzed on a 6 sec-by 6 sec and cumulative basis. Blood lactate concentrations were determined during rest, the third, ninth and nineteenth min of recovery. Results revealed significant main effects for active vs passive recovery and 10 vs 20 min recovery with active and 20 min recovery resulting in significantly higher post-recovery pedal revolutions ($p < .001$) and enhanced rates of lactate removal during recovery ($p < .001$). Oxygen inhalation during recovery had no effect on post-recovery performance or lactate removal ($p > .05$) The correlation between blood lactate levels at the end of recovery and pedal revolutions on the post-recovery exercise task was only $r = -.19$ suggesting that factors other than lactate removal are critical for subsequent performance.

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April 8, 1978
9:00-12:00 pm
Poster #14

TIME COURSE OF O_2-PULSE DURING VARIOUS TESTS OF AEROBIC CAPACITY.
Robert A. Wiswell, University of Southern California; Herbert A. deVries, University of Southern California.

The purpose of this study was to test the hypothesis that oxygen pulse typically reaches a maximum before maximal oxygen consumption by observing the time course of oxygen pulse throughout exercise to maximal stress and to discern those physiologic variables which might predispose an individual to reach a peak in oxygen pulse before achieving maximal oxygen consumption. Thirty male volunteers ranging in age from 18 to 25 ($\bar{x}$ = 20.5) were recruited for this study. Based upon the results of the exercise test, subjects were classified into subgroups as a consequence of whether or not a maximal oxygen pulse or a plateau in oxygen pulse was demonstrated during submaximal exercise. The results indicate that submaximal peaking or at least the achieving of plateau values of oxygen pulse does in fact occur in some but not all individuals. It was observed that this phenomenon occurs at a relatively high percentage of maximal heart rate and maximal oxygen consumption. It appeared that individuals who demonstrate low heart rates at low-work intensities, high maximal heart rates, and a disproportionate increase in R for a given ventilation are most likely to reach a submaximal peak in oxygen pulse. Oxygen pulse during submaximal exercise appears to provide a good indication of cardiorespiratory fitness.

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April 8, 1978
9:00-12:00 pm
Poster #15

SOCIO-POLITICAL USE OF PHYSICAL ACTIVITY IN THE UNITED STATES, THE SOVIET UNION AND CHINA - Mark W. Clark, Hofstra University

This presentation investigates the attachment of socio-political ideology to physical activity. The primary aim was to determine if stated political ideology matched stated and actual objectives of physical education and sport. The United States, the Soviet Union, and China were selected because they represent different perspectives on a continuum of both political ideology and stated cultural approaches to physical activity. Government sponsored writings on both political ideology and approach to physical education and sport from each country were analysed to determine a "stated position." Other sources were then utilized to compare this stated position with "actual practice." This comparative analysis of socio-political ideology and physical activity indicated the following for each country:

United States - Ideology is rarely overtly stated, but it is directed toward individual perseverance and hard work to gain "success" and upward mobility. Similar patterns prevail for physical education and sport. However, at high competitive levels, government sponsorship and subsidization is increasing.

USSR - Worker ownership and collective action resulting in an appropriate reward for service rendered is the stated ideology. Actions are not for self gain, but for the collective good. Physical Education (Physical culture) seems consistent depending on the interpretation of the collective contribution an athlete makes to society.

China - Chinese ideology is similar to that of the Soviet Union, but with the added element of continued self-criticism to enhance the goals of a communistic society. The stated aims of physical education (physical culture) and sport match the stated ideology. Little is known about physical education and sport in China, but reports indicate that practice approaches stated ideology. In conclusion, each country attaches its own political meaning and ideology to physical activity in order to stabilize and strengthen itself and thus better promote its respective ideology in the international marketplace of political power.

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April 8, 1978
9:00 am

SPORT IN THE PEOPLE'S REPUBLIC OF CHINA: SELECTED ISSUES, Donald Chu, Stanford University.

The purpose of this paper is to explore various sociological issues relative to sport and physical culture in the PRC. Research on this topic is necessarily descriptive and to a degree speculative at this infant stage of inquiry on this subject. Goals of the paper: An understanding of sport in China and an understanding of Chinese society. Method: As information and empirical data on the subject is severely limited, this paper is based largely on an analysis of the popular Chinese press, particularly as available through the Survey of the PRC Press. Available sociological research on China as well as relevent general theory will be applied. Summary of Findings: 1) The "functionalist-meritocratic" compatibility with the sport concept of "leveling-out" is totally contrary to the Maoist doctrine; 2) There is a strong emphasis on the "means" (as opposed to the "ends" of sport which which has implications for the avoidance of "anomie" (in Durkheim's sense) which may be befalling soviet society; 3)Sport in China may be understood from an organizational perspective. The image of sport is crucial to the legitimacy and hence survivability of sport in China. Strong efforts have been made to maintain the proper image of sport in the mainland press; 4) Chinese sport may be understood relative to the backdrop of an anti-physical exertion tradition and forces pushing for change at the time of the revolution which lead to a confused prognosis for the acceptance of sport by the masses; 5)the social-psychological issue of the potential of sport as a change agent in society is discussed and it is pointed out that the emotions involved in sport point to great promise for the use of sport as a means of reshaping society (as suggested by Orville Brim's classic essay on later life socialization). Scientific importance of the study: So much of prior sociological analyses of sport have been based on western versions that the public as well as sport sociologists have come to see sport soley in those terms. Multi-cultural study of highly divergent sport forms is crucial at this stage in the development of the field if the proper parameters for study, the framing of important questions for analysis are to be fruitfully accomplished. A study of this sort not only sheds light on sport in China but on the academic field of the study of sport in general.

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April 8, 1978
9:15 am

SPORT IN THE GERMAN DEMOCRATIC REPUBLIC:REBUTTING THE ACCUSATIONS,
Brian R.Chapman,University of Oregon.

The Olympic successes of East Germany(GDR) have aroused unfavorable comment from many Western writers,sports leaders and physical educators.There is a need to examine the GDR approach more closely in order for us to form an educated opinion.The purpose of this study was to discover and analyse the arguements employed by GDR spokesmen to rebut criticism levelled at their sports system.To gather information,the writer spent 11 days in Leipzig,GDR,on the occasion of the 1977 Spartakiad and Sports Festival.During this visit,it was possible to record reactions to the criticism through interviews,group discussion and casual conversations.In addition,much printed material was collected. Finally,the writer used the library-documentation centers of the British Sports Council and the Physical Education Association of Britain together with the Coaching Association of Canada's Sports Information Resource Center to locate most of the articles that have been written on GDR sport.Views expressed in these were compared with the information the writer collected in Leipzig.The most frequent criticisms levelled at the GDR sports system are:

1. Sport is politically-oriented.
2. The government maintains a cadre of professional athletes.
3. There is a concentration on the elite athlete.
4. Women athletes are masculinised.
5. Scietific methods used are inconsistent with "sport".
6. Steroids and other additives are employed.
7. Children are forced into sports based on data from tests.
8. Youngsters are sent away from their families to sports schools
9. Fun is taken out of sport.
10. The secrecy surrounding their sports research indicates evil.

GDR arguements in defence involve:

1. A philosophy of sport that stresses maximum fulfillment of individual potentials.
2. The nature of socialist society.
3. Counter-accusations against Western nations,especially the USA
4. A non-sexist view of the woman as an athlete.
5. Persuasive explanation of policies which seem undesirable.
6. Lack of evidence or distortion of evidence by the critics.
7. Denial.

The writer has concluded that most of the criticism levelled at the GDR sports system has derived from media sensationalism, suspicion of Communism,disappointment with defeats,ignorance of the facts and failure by the critics to comprehend a different philosophy of sport and life.

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April 8, 1978
9:30 am

PHYSICAL EDUCATION RESEARCH IN JAPAN. Tetsuo Meshizuka, Tokyo Metropolitan University, Mineo Maekawa, Chukyo University.

The professionally equipped researchers of physical education and its related areas are usually sought at present among those who belong either to Japanese Society of Physical Education (3800 members), or to Japanese Society of Physical Fitness and Sport Medicine (1400 members), which publish their professional periodicals; (a) Research Journal of Physical Education (Vol.22, quarterly), (b) Japanese Journal of Physical Fitness and Sport Medicine (Vol.26, quarterly) respectively.

At each of these convention held annually, approximately 12 to 15 per cent of the entire members present their research reports alone and with co-workers; 580 reports for the former, and 130 reports for the latter in 1977.

All the oral reports for the convention inclusive of those for symposia and task research projects, and the editorial examnation for the articles to be screened by the editors of the research journal are made in accordance with the research divisions of the society for which one third of the members are affiliated: (1) Philosophy, (2) History, (3) Sociology, (4) Methodology, (5) Administration, (6) Psychology, (7) Growth and Development, (8) Kinesiology, (9) Measurement and Evaluation, (10) Physiology, (11) Health.

Not all these reports with only a short abstract naturally can not be developed into complete research reports in the authentic periodicals, but they are first of all published in the Convention Issue each year by dint of the organizing committee of the convention, and their full reports are in most cases printed in the research report of each their own institutions later.

There is a tendency, however, that the ratio between the number of these abstracts and the articles published in our officially accepted periodicals differs in terms of the difference either natural or human and social sciences, that is to say, more reports of natural sciences are published in these periodicals than those of social sciences as the articles, and oftentimes, the number of articles published even exceeds that of orally reported.

Fortunately, our area of endeavour has been accepted among academicians in Japan, and placed officially into all the hierchy as to science, and the society now sends two members for the Science Council of Japan. It is , however, highly expected that the research products of our fields could be more efficiently utilized for the health and fitness of citizens in particular.

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April 8, 1978
9:45 am

A SURVEY OF PARENTAL ATTITUDES TOWARD COMPETITION IN YOUTH SOCCER LEAGUES. William L. Summers and H. Edsel Buchanan, North Texas State University.

Purpose of the Study. The purpose of this study was to determine if parental attitudes (male and female) would differ significantly toward competition for different age boys participating in youth soccer leagues. Procedures. The data was obtained through a survey questionnaire which was distributed to parents of boys participating on seven teams in an under-eight age group (consisting of boys six and seven years of age) and on seven teams in an under-ten age group (consisting of boys eight and nine years of age). A random method of selection was utilized for selecting which fourteen teams out of a population of forty-four teams would be surveyed. The instrument for this study was Scott's Attitude Inventory for measuring attitudes toward athletic competition at the elementary school level. A Likert procedure was used to measure attitudinal responses to each inventory statement. Data was analyzed through the use of analysis of variance and t tests. Also, percentages were computed to determine if parental attitudes were favorable or unfavorable toward competition in youth soccer leagues. Findings. The data revealed that parents held a positive attitude toward intensive competition in youth soccer leagues. Attitudes of parents of boys six and seven years old did not differ significantly from those attitudes held by parents of eight-and nine-year-old boys. The mothers of sons under ten expressed a significantly more positive attitude toward competition for their sons than did fathers of sons under-ten years of age. Conclusions and Recommendations. Intensive soccer competition found among boys six through nine is viewed as being positive by both male and female parents. A study of parental attitudes toward intensive competition in other sport activities (for both boys and girls) should be conducted to determine if a significant difference in attitude exists toward competition in different sport activities.

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April 8, 1978
10:30 am

SURVEY ON SPORT AND PHYSICAL ACTIVITY OF STUDENTS ATTENDING THE UNIVERSITY OF IOWA SUMMER SPORTS SCHOOL

E. Keith Milner - University of Illinois
John A. W. Baker - University of Iowa

The purpose of the study was: 1) to obtain biographical data on students and 2) to gather background information on school physical education programs. It was hoped that the conclusions could be used in physical education curriculum analysis and development at the secondary school level. The University of Iowa Summer Sports School 1976 took place during a six week period from mid June to early August. Throughout this period 1,449 students participated for one week in one of the 14 sporting activities. The students, of whom 986 (68%) were male and 461 (32%) were female ranged in ages from 12 to 18 years. The major conclusions drawn from the study were: 1. There appears to be definite trends in relation to where students live and the popularity of certain sports. 2. As the age of the student increases, the desire for single sex programs decreases. 3. There appears to be a need for including the following activities in the secondary school curriculum: archery, camping, canoeing, horseback riding, riflery, sailing, scuba diving, water skiing, bowling, cycling, weight training, judo, karate, and self defense. 4. There is an indication that most secondary school students have not been exposed to the following activities: badminton, casting and angling, field hockey, figure control, lacrosse, orienteering, racquetball, relaxation techniques, water polo, W.S.I., and yoga. 5. Activities which had a high female preference were: modern dance and synchronized swimming. 6. Activities which had a high male preference were: judo, football, care of injuries, handball, camping, billiards, baseball, paddleball, riflery, relaxation techniques, rock climbing, rugby, soccer, table tennis, trampolining, weight training, and wrestling.

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April 8, 1978
10:45 am

*EFFECTS OF NATURALLY INDUCED EXPECTATIONS ON THE RATINGS OF PHYSICAL PERFORMANCES BY FEMALE JUDGES.** Charles Ansorge, John Scheer, Jan Laub, James Howard, University of Nebraska-Lincoln.

Gymnastics coaches for both men's and women's teams typically place their gymnasts in a rank order from poorest to best for competition in each event. Rank ordering gymnasts may create the natural expectation that scores will rise as each within-team order of competition progresses. Therefore, the purposes of this study were to (1) determine the possible effects of individual placement within the team order of competition upon the scores awarded by nationally or regionally certified female gymnastics judges and (2) determine the relationship between the degree to which judges are influenced by the within-team position of gymnasts and internal-external locus of control. The Team Optionals of the Region VI AIAW Gymnastics Meet were videotaped in March, 1977. Ten nationally or regionally certified gymnastics judges were selected from three locations in the United States and asked to score the routines on each of two sets of videotapes, edited from the original tapes, in two judging sessions separated by 48 hours. Although the judges were told that they would judge the actual AIAW meet twice, the two videotapes were not the same. For each team two gymnasts were selected who had similar performances. One of the two was randomly selected to appear in the first position for her team order and the other was placed in the fifth position for the first videotaped scoring session. For the second testing session the first and fifth positions were reversed from the first set of tapes. In this manner, scores were collected for 40 routines, each of which appeared both first (test scores) and fifth (retest scores) in the within-team orders of competition. A 2 X 2 X 12 ANOVA was utilized, and F-ratios were considered significant at the .05 level. Two of the three main effects were significant, indicating that (1) a gymnast performing the same routine is at a scoring advantage if she is judged as the fifth competitor for her team rather than the first competitor, and (2) differences in the scores awarded exist among 12 nationally or regionally certified gymnastics officials. In addition, no evidence was found of a relationship between the degree to which judges were influenced by the within-team position of gymnasts and locus of control.

*This study was supported by a grant from the Nissen Corporation of Cedar Rapids, Iowa.

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April 8, 1978
11:00 am

VALIDATION OF PREDICTION TESTS OF SWIMMING ABILITY. Charles W. Jackson, Old Dominion University; Jesse L. Tench, Jr., U.S. Coast Guard Training Center; Christina W. Jackson, College of William & Mary.

The purpose of this study was to validate college age prediction tests for determining one's specific level of swimming ability. An experimental 15-item test battery was administered over a three day period to 108 men and 65 women enrolled in various swimming courses at Old Dominion University. Raw scores were transformed to Sigma scores and summed to obtain the criterion measure. All items were factored by sex using the principal components factoring technique with iteration. Stepwise multiple regression procedures were employed with the investigators limiting the choice of variables to 25 yard timed or power items. Also the choice of items were restricted to have the same basic test battery for men and women. Principal components factor analytical techniques indicated that all items significantly loaded on one underlying factor. By using the computed multiple correlation coefficients of the selected test items, regression equations were obtained for predicting the criterion measure. The weighted scores made on each selected test item could then be added to predict one's swimming ability level (SAL). Sexual differences were anticipated throughout the study, so the data were analyzed separately for men and women, with the derivation of different regression equations by sex. Three separate regression equations were established for men (R = .851 to .944) and women (R = .891 to .956), and these equations differ from our original work. Norms were also constructed for six swimming ability levels. The three test item regression equations were selected as practical tests for swimming prediction which had now been validated by the factor analyses. These equations require the performance of three different strokes measured objectively by timing or counting of exact strokes. The equations were as follows:

$$SAL_m = -23.07X_4 - 10.39X_{15} - 11.80X_6 + 1589.76_C \quad (R = .944)$$

$$SAL_f = -18.58X_4 - 7.28X_{15} - 6.38X_6 + 1501.08_C \quad (R = .956)$$

KEY TO EQUATIONS: SAL = Swimming Ability Level (male or female)

X_4 = crawl for time

X_6 = breast for time

X_{15} = side for # of strokes

C = constant

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April 8, 1978
11:15 am

STEPWISE DISCRIMINANT ANALYSIS OF VOLLEYBALL SKILL TESTS AND BIOGRAPHIC DATA. Mel R. Fratzke, Edmond F. Lundstrom, Ward M. Wells, University of Minnesota, Duluth.

The purpose of this study was to investigate the relationship of volleyball skill tests and player biographic data to success in playing volleyball. Eighty-one male and female subjects ranging in age from 18 to 21 attending the University of Minnesota, Duluth, spring quarter of 1976, and enrolled in a beginning volleyball course (four sections) were administered seven volleyball skill tests after completing the ninth week of instruction. The volleying test, serving test, the passing test, and the set up test were selected from the AAHPER SKILLS TEST MANUAL. Three skill tests were developed over a fifteen year period by Ward M. Wells, which include the overhead free volley test, alternate wall volley test, and the timed wall volley test. In addition, a standing vertical jump test and a written knowledge test were administered while biographic data of age, weight, height and previous experience were obtained from a questionnaire. Criterion group were established by designating proficient volleyball players (N=42) and average (N=39) participants. The subjects were rated by two college professors, two collegiate volleyball coaches and a certified volleyball official for a minimum of two complete games. These ratings were the basis for the selection of the appropriate grouping of proficient or average volleyball players. Raw scores of the seven volleyball skill tests, the vertical jump test, the written know-test score, previous playing experience and their biographic traits were analyzed by the Multiple Discriminant Stepwise Analysis statistical procedure. This procedure attempted to identify the factors which tended to contribute most heavily to discriminating between the proficient and average volleyball participants. The statistical procedure revealed three variables that significantly discriminated between group membership. The leading predictor of group membership was the standing vertical jump followed by the Wells timed wall volley test and previous playing experience. The remaining factors contributed to group membership in the following order: written knowledge test, weight, AAHPER passing test, AAHPER serving test, AAHPER set-up test and age. The stepwise multiple discriminant regression equation helped reclassify 34 of 42 proficient participants and 33 of 39 average participants back into their respective groupings. Approximately 83% of the time, the regression equation properly reclassified the volleyball participants.

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April 8, 1978
11:30 am

54

BACKCOURT DIGGING POSITION AND SKILL PERFORMANCE IN VOLLEYBALL.
James M. Acer, Kansas State University; Richard H. Cox, Kansas State University.

The purpose of this investigation was to study the relationship between backcourt digging position and skill performance in men's double "A" volleyball (USVBA Region Eight) teams. Previous research has centered on such skill variables as spiking, serving and service reception. Such skills as blocking and backcourt digging have been ignored due to the lack of an adequate system of evaluation. In the case of backcourt digging, a rule change (USVBA) instituted during the 1976-77 season alleviated this problem. Specifically, the rule change allowed an additional three touches of the ball by the defensive team irregardless of whether or not the ball was first contacted by the block. This eliminated the need for two separate systems of evaluation. Utilizing an adaptation of Coleman's four-point statistical charting system, data were collected on 60 games during the 1976-77 season. In total, 756 backcourt digging attempts were rated on a four category nominal scale. To facilitate the evaluation of the results, contingency tables were constructed for each of the following situations: a) total dig attempts irrespective of spike origin, b) dig attempts against on-hand spiker, c) off-hand spiker, and d) against a middle-attack. Chi-square analyses, on all four contingency tables resulted in insignificant chi-squares at the .05 level of confidence. The results of this investigation indicate that there is no relationship between backcourt digging position and skill performance in men's double "A" volleyball (Region Eight). Consequently, the common practice of switching backcourt players for the purpose of placing better diggers in the more "difficult" positions is of questionable value. However, there may be justification to switch backcourt players for the purpose of placing a team's best player where the most balls are hit (cross court against on-hand hitter), or to position the setter in an advantageous position for offense.

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April 8, 1978
11:45 am

THE PROGRESSIVE SWING METHOD VERSUS THE TRADITIONAL METHOD OF TEACHING GOLF TO BEGINNERS. Dr. Tim Brown, University of Delaware.

The purpose of this study was to compare two methods of instruction of golf skills to beginning golfers. The hypothesis was that the "Progressive Swing Method" would have no significant effect in the acquisition of golf skill. The sample consisted of 64 male and female undergraduate students (M=30, F=34) with no prior golf experience. The subjects were randomly assigned to one of two groups. The control group used a traditional approach, starting with a short iron (9 iron) and progressing to the 7 iron to the 5 iron and then to the fairway wood (3 wood). The experimental group used the "Progressive Swing Method". This method used four different length clubs (18", 24", 31", and 35"). The first three clubs (18", 24", and 31") were all middle irons (4 iron or 6 iron) while the last club (35") was a 4 wood. Subjects hit balls from a table which was covered with a synthetic turf and was adjusted to the proper height for each subject when using different length clubs. Subjects participated in golf three times a week for four weeks in their respective treatments. The next two classes were spent practicing with the club to be used during the skill test (7 iron). All subjects received group and individualized instruction from one of two instructors. Each instructor taught each group according to the design sequence. General class instructions were given to the class as a whole before breaking into treatment groups for more group and some individual instruction. The skill test consisted of 10 shots with a 7 iron at a grid target. It was scored according to where the ball landed not where it rolled. Distances varied for men and women. The t-test for difference between two-independent means was used to analyze the data at the .05 level. The results of the analysis of the data showed no significant difference between the means for men, women, or the combined groups. It was concluded that the use of the "Progressive Swing Method" for teaching golf to beginning golfers in this study was not effective in the attainment of higher scores on the skills test.

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April 8, 1978
12:00 pm

THE MAN WHO MADE "CASEY" FAMOUS. Roberta J. Park, University of California, Berkeley.

Numerous authors have characterized the 1880s as baseball's "Golden Age", describing the earnestness with which local teams were formed and their activities avidly followed. The "folk hero", who has always been an important feature of America's "national game", developed early in the history of the sport. In addition to the hero-worship which attached itself to colorful real-life figures, a fictitional "hero" (perhaps, better-stated, "anti-hero") arose. This was the legendary "Casey" of the poem Casey At The Bat. (Martin Gardiner, author of The Annotated Casey At The Bat, has recorded 27 variations of the original ballad). Who was this Casey? How did his story originate? How was it popularized? These are the questions with which this investigation deals--with the major emphasis being placed upon the significance of the contributions of William DeWolf Hopper, "the man who made Casey famous." During his lifetime DeWolf Hopper (1858-1935) was considered to be one of the most brilliant figures of the American stage. Productions in which he starred for over 50 years were legion; his comic opera roles were especially noteworthy. Hopper was, from early youth, a devoted baseball fan. A chance circumstance enabled Hopper to recite Ernest L. Thayer's comic ballad Casey At The Bat during a stage performance at Wallack's Theater, New York, in 1888. (The poem had first appeared in the San Francisco Examiner's Sunday humor column on June 3, 1888). By the early 1890s Hopper's increasingly frequent recitations of Casey were beginning to make the poem famous, and by 1925 he would declare that he had recited it "10,000 times." There was a certain natural affinity between Hopper and Casey--here could be combined the actor's strong sense of "good theater" with his love of the "national game". An unerring judge of what would appeal to American audiences, Hopper maintained that it was the final resolution of the plot which gave to Casey At The Bat its special appeal. It was, he believed, the tension created by the uncertainty of success or defeat, so prevalent in sport, which brought fans to ball parks when the "Babe" (Ruth) was playing and which endeared Casey to his audiences. At the age of 72, Hopper began a new career in broadcasting. In 1935 he was quoted in the Chicago Herald and Examiner: "It was Casey At The Bat who first made my voice familiar to radio listeners. I owe a lot to Casey and I love him." Certainly, he did owe a lot to Casey, but it seems equally reasonable to suggest that Casey owed a lot to DeWolf Hopper.

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April 8, 1978
12:15 pm

THE RELATIONSHIP BETWEEN THE DOMAINS OF PERSONALITY AND ATTITUDES TOWARD PHYSICAL ACTIVITY. Frederick J. Miranda, Houston Metropolitan Racquet Club; G. Robert Ward, University of Houston.

The purpose of this study was to examine the relationship between the domains of personality and attitudes toward physical activity. A theoretical model was developed using Cattell's Theory of Personality and Kenyon's Attitudes Toward Physical Activity. Subjects utilized in this study included 320 college males enrolled in physical activity classes at the University of Houston. During one testing session, Cattell's 16 PF Questionnaire, Form C and Kenyon's Attitudes Toward Physical Activity Scale were administered to each subject. The sixteen personality factors were used as the independent variables and the six attitude factors were used as the dependent variables. Canonical analysis identified three significant roots. The first canonical root (R_c = .5596) was isolated with the personality variable SENSITIVE and the attitude variables AESTHETIC EXPERIENCE. The second significant canonical correlation (R_c = .4076) was isolated, essentially, with the personality variable ADVENTUROUSNESS and the attitude variable PURSUIT OF VERTIGO. The third canonical correlation (R_c = .3946) identified the personality variables SELF-SUFFICIENCY and SURGENCY and the multidimensional attitude variable CATHARSIS, comprised of the attitude variables SOCIAL EXPERIENCE, HEALTH AND FITNESS, AESTHETIC EXPERIENCE, and ASCETIC EXPERIENCE were related. These findings supported the conclusion that the domains of personality and attitudes toward physical activity were significantly related in at least three different ways.

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April 8, 1978
1:00 pm

MOTOR PERFORMANCE UNDER THREE LEVELS OF TRAIT ANXIETY AND STRESS. Robert S. Weinberg & John Ragan, University of California, Los Angeles

One of the most pervasive and yet not clearly understood problems in sport psychology has been the relationship between arousal and motor performance. Martens (1971,1974) suggests that the inverted-U-hypothesis provides the most promise investigating the arousal-motor relationship. However, the interactive effects of trait anxiety and stress on performance have been neglected in assessing the viability of this hypothesis. The present investigation tested the inverted-U-hypothesis using three levels of trait anxiety and psychological stress. 30 high-anxious, 30 moderate-anxious and 30 low-anxious subjects were selected using Spielberger's STAI. Subjects were randomly assigned to either high, low or moderate stress. The stressor employed was feedback concerning the subject's performance against a standard of excellence. The task involved throwing a tennis ball at a target consisting of three concentric circles. State anxiety results indicated that three distinct levels of stress were created by the experimental conditions. Performance results produced an inverted-U- curve for the three levels of stress with subjects in the moderate-stress condition displaying the best performance. In addition, a significant Trait Anxiety x Stress interaction indicated that high-anxious subjects performed best in the low-stress condition, whereas low-anxious subjects performed best in the high-stress condition. Results are discussed in terms of existing theories that attempt to explain the relationship between anxiety and motor performance including Easterbrook's cue utilization theory, Weiner's cognitive theory and test anxiety theory. Future studies need to concentrate more on cognitive factors which seem to mediate between anxiety and its effects on motor performance.

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April 8, 1978
1:15 pm

THE EFFECTS OF RESULTANT ACHIEVEMENT MOTIVATION ON THE EFFICIENCY OF MOTOR PERFORMANCE. William T. Weinberg, University of Louisville; Burris F. Husman, University of Maryland; Richard B. Cobb, Syracuse University.

The purpose of this study was to examine the effects of resultant achievement motivation (N Ach) on the efficiency of motor performance. More specifically, an attempt was undertaken to account for the consistent finding that under achievement-oriented conditions persons with high achievement needs perform better than persons with low achievement needs. Based on scores from the Mehrabian Achievement Scale, 20 male college students were classified as high in resultant N Ach and 20 male college students were classified as low in resultant N Ach. The 20 participants within each motive group were then randomly assigned to either relaxed or achievement-oriented conditions. In each condition participants performed 27 trials, each of 10 second duration on a pursuit rotor task. Each trial was followed by a 10 second rest interval. After a 10 minute rest period participants completed an additional 27 trials. Each session of 27 trials was then grouped into nine blocks, each consisting of three trials for purposes of analysis. Statistical analyses included both exponential curve and a three factor (motive classification (2) X experimental condition (2) X blocks of trials (9) ANOVA for each session with repetition on the final factor. The pertinent results are as follows: (1) During the first session, high N Ach participants performed significantly better than low N Ach participants under achievement-oriented conditions with the pattern of results being reversed for relaxed conditions, $F\ (8,28\mathcal{E}) = 3.47$, $p < .01$; (2) The asymptotic value for the high N Ach group was significantly greater than that of the low N Ach group under achievement-oriented conditions; (3) Following the 10 minute rest period no performance differences were found among the motive groups; and (4) The low N Ach group demonstrated significantly more reminiscence than the high N Ach group under achievement-oriented conditions. It was concluded that Atkinson's resultant achievement motivation theory accounts for motive group differences during the initial stages of motor performance. However, these differences dissipate during a rest interval so that the subsequent performance of low N Ach persons is not hindered. Implications for contemporary research with consolidation theories of memory are discussed.

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April 8, 1978
1:30 pm

THE USE OF MULTIPLE REGRESSION ANALYSIS IN SOCIAL SCIENCE RESEARCH. Jean L. Perry and Timothy G. Lohman, University of Illinois at Urbana-Champaign.

The study compared two methods of statistical analysis, analysis of variance and multiple regression analysis, to relate various independent variables to job satisfaction. Daniel (1971) studied the job satisfaction of faculty members (N=194) in physical education departments in Ontario universities. Using analysis of variance, Daniel found that faculty members with senior rank and those with tenure were more satisfied with pay, promotion, and total job satisfaction; males were more satisfied with promotion; subjects with doctorates were more satisfied with work, promotion, and total job satisfaction. Neither years at the university nor age were found to have any effect on job satisfaction. When Daniel's data were reanalyzed using multiple regression analysis, some different findings resulted. As with the original study those faculty members with senior rank were found to be more satisfied with pay and total job satisfaction; however, in the reanalyzed study associate professors and professors were more satisfied with supervision than were assistant professors. Also, in the reanalyzed study females were significantly more satisfied with pay than were males. The multiple regression analysis supported Daniel's findings that years at the university and age had no effect on the job satisfaction of the subjects. However, using multiple regression analysis it was also found that degree and tenure had no significant effect on job satisfaction. Through multiple regression analysis the effect of an independent variable on a dependent variable is considered holding constant the effects of the other independent variables. Somewhat different results can occur than when the effects of the other independent variables are not held constant, particularly where there are unequal subject numbers for subclassifications. Thus the results of studies which use such statistical tools as chi-square or analysis of variance looking at one variable at a time may not be as accurate an account of the actual situation as could be presented had the data been analyzed using multiple regression analysis.

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April 8, 1978
1:45 pm

ABILITY OF BIOCHEMICAL AND PERSONALITY VARIABLES IN DISCRIMINATING BETWEEN PHYSICAL FITNESS LEVELS. R. John Young, Washington University; A. H. Ismail, Purdue University.

The discrimination ability of selected biochemical and personality variables between high- (n=14) and low- (n=14) fitness groups was determined before and after a four month physical fitness program of jogging, calisthenics and recreational activities. Relevant physiological data were collected initially and finally and physical fitness scores were obtained for each subject using a regression equation. Biochemical variables were serum cholesterol, serum glucose, serum testosterone, and urinary catecholamines. Personality data were obtained using the Cattell 16PF Questionnaire, the Eysenck Personality Inventory, and the Anxiety scale of the Multiple Affect Adjective Check List. The t-test was used to compare the high- and low- fitness groups before and after the exercise program and to compare the pre- and post-test mean values of the two groups. In addition, several discriminant function analyses were performed at each test period on the biochemical and personality data and the best discriminators were identified by the values of the discriminant function coefficients. The best discriminators were combined and a final discriminant function analysis was performed on the pre- and post- test data. Significant t-ratios were found between the groups on several physiological variables confirming their discreteness, especially at the pre-test. Compared with the low-fit the high-fit group scored significantly higher on Factor M at both the pre- ($p<.01$) and post- ($p<.05$) tests and significantly lower ($p<.01$) on Factor L at the post-test. At the pre-test the high-fit group had a significantly ($p<.05$) lower serum glucose level and a significantly ($p<.05$) higher serum testosterone level than the low-fit group. Three 16PF Factors (M,H, and L) and the four biochemicals were capable of significantly ($p<.05$) discriminating between high- and low- fitness groups before and after the program. While the order of discrimination was slightly altered at the post-test, the highly fit individuals were consistently more unconventional, adventurous and trustful and had lower catecholamine, glucose and cholesterol levels and a higher testosterone level than the unfit subjects.

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April 8, 1978
2:00 pm

A FOLLOW-UP STUDY OF THE ROLE PERCEPTIONS OF UNDERGRADUATE PROFESSIONAL PHYSICAL EDUCATION STUDENTS. Marie Weber, University of Wisconsin.

The major purpose of the study was to determine if a change had occurred in the perceptions of a group of female physical education major students relative to their professional role, between their freshman and senior years. Seventy-four female undergraduate physical education major students, who had participated as freshmen in the investigator's initial study of the role of the high school physical education teachers, were contacted in their senior year and asked to respond a second time to the Teacher Competency Questionnaire.[1] Completed questionnaires were received from 55 senior students, representing a return of 74%. Utilizing data obtained in the original factor analysis study, group mean scores for competencies contained in the factor structure of the university faculty served as the criteria against which changes in group mean scores of the major students were plotted. In the original study, university faculty had divided the role of the physical education teacher into the following five subroles: 1) program manager, 2) teacher and promoter of health, 3) promoter of human relations, 4) evaluator, and 5) movement analyst. A comparison of student group mean scores in the freshman year with those in the senior year indicated that: 1) As seniors, students had assigned greater importance to 39 of the 48 competencies contained in the five subroles identified by university faculty; 2) Senior student scores more closely paralleled faculty scores in the majority of competencies contained in four out of five subroles; 3) There was a greater difference between senior student and faculty scores in the majority of competencies contained in the program manager subrole. Based on the preceding results, the following conclusions appear to be warranted: 1) As seniors, the students placed greater importance on those competencies related to immediate on-the-job needs of the teacher, professional responsibilities, human relations, and decisionmaking; 2) The views of students in the senior year more closely paralleled faculty views than did the views of students in the freshman year; 3) Senior student views were more similar to faculty views in theoretical aspects of the physical education teacher's role; there was a greater difference between student and faculty views in those areas which were related to the practical aspects of teaching physical education.

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[1]Weber, Marie. "Physical Education Teacher Role Identification Instrument," Research Quarterly, 48:445-451, May 1977.

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April 8, 1978
2:15 pm

A COMPARISON OF MOTOR CREATIVITY AND MOTOR PERFORMANCE OF YOUNG CHILDREN. Wenda D. Johnson, Newberry College.

This study investigated the relationship between motor creativity and motor performance. Subproblems of the study investigated the relationship of age and sex of the subjects with their ability to exhibit a number of creative movement responses in given situations and motor performance. The Wyrick Test of Motor Creativity and a motor performance test battery (consisting of the standing broad jump, 40 yard dash, tennis ball throw for distance, sidestepping test, and a Bass stick test) were individually administered to 48 boys and girls aged 3 years 6 months to 6 years 6 months who were enrolled in the Early Childhood Physical Development Program at Indiana University. Results of the study were as follows: (1) There was a significant relationship between motor creativity and motor performance. (2) Neither age nor sex was related to motor creativity. (3) Except on the tennis ball throw for distance test on which boys scored better than girls, there were no sex differences in motor performance. (4) Motor performance scores increased with age. Based on these results, and within the limitations of this study, the following conclusions seem justified: (1) Children who score well on measures of motor creativity should score well on measures of motor performance. (2) Motor creativity of young children does not tend to be related to age or sex. (3) In general, there are no significant sex differences in motor performance of young children. (4) Motor performance increases with age.

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April 8, 1978
2:30 pm

MOTOR CREATIVITY OF PRESCHOOL CHILDREN ON THE LONDON TRESTLE TREE APPARATUS. Ellen Lubin and Claudine Sherrill, Texas Woman's University.

This investigation entailed the study of the motor creativity of twenty preschoolers on a novel piece of equipment, the London Trestle Tree Apparatus. Videotape data were collected on three and four year olds at the Texas Woman's University Preschool and Child Care Center showing the rate of change in motor fluency and motor originality over a one month period during which no experimental condition was introduced. Motor Creativity, according to Wyrick (1968) is composed of motor fluency (frequency in which each part of the apparatus was touched) and motor originality (frequency of specific motor responses during the touches). Children were videotaped individually for five minutes in an unstructured play setting on the London Trestle Tree Apparatus. The resulting videotapes were viewed by two raters who independently recorded the frequency of occurrence and uniqueness of motor responses on the preconstructed individual motor fluency and motor originality score sheets. High inter-rater objectivity and test-retest reliability measures were computed. Findings using one-way analysis of variance with repeated measures and two-way analysis of variance indicate that motor fluency and motor originality scores did not change over trials for the group as a whole or with boys and girls scored independently. This indicates that motor fluency and motor originality appear to be relatively stable traits when no instruction is provided between trials. It was concluded that the preschoolers were no more creative in their movement responses to a novel piece of apparatus after a one-month period of play in an unstructured play setting than they were at the initial exposure to the apparatus.

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April 8, 1978
2:45 pm

FACTORS EFFECTING DISPLACEMENT AND LOCATION REPRODUCTION. Judith Patterson and Richard Engelhorn, University of Illinois.

The data from short-term motor memory studies indicate that subjects are most accurate in reproducing the movement end-point location when instructed to rely on location rather than distance information. It is important to determine if this relationship would continue to be demonstrated when factors such as velocity and load comparisons between trials were manipulated. The purpose of this study was to investigate the effect of load and velocity information on learning to reproduce either a displacement or a location in a wrist flexion task. Twenty-nine volunteers were randomly assigned to one of six groups as follows: (1) location with velocity and load changes; (2) displacement with velocity and load changes; (3) location with velocity; (4) displacement with velocity; (5) location with neither velocity nor load changes; and (6) displacement with neither velocity nor load changes. Five movement distances (9, 15, 19, 24, and 31 degrees) and seven load differences (-200, -150, -50, 0, 50, 150, and 200 grams) were used. Subjects performed a series of 42 learning and performance trials. In the learning trials, subjects were given either a low or high tone whenever they were moving too slow or too fast to the target criterion and a red light flashed on whenever the subject had moved just past the target criterion. The low or high tone signaled above or below the target criterion while absolute silence indicated on target. Performance trials were not assisted by augmented feedback. All trials were completed within 22 seconds. Absolute error scores were obtained for performance trials 4, 5, 11, 12, 36, 37, 41, and 42. The ANOVA indicated that learning and load changes, as main effects, were significant. There were no significant differences between displacement and location tasks nor among the various treatment combinations of velocity and load changes. Subjects were able to learn the distance and location tasks equally well regardless of the velocity and load changes. The implication is that distinctions between distance and location cues facilitating reproduction accuracy may not be the only cues providing encoding information, as load differences between trials especially appears to provide information.

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April 8, 1978
3:00 pm

EFFECTS OF IPSILATERAL AND CONTRALATERAL FACILITATION UPON THE COMPONENTS OF FRACTIONATED REFLEX TIME. Harold H. Morris and Terry J. Whieldon, Ithaca College.

This investigation considered the effects of maximal and submaximal Jendrassik facilitation of the ipsilateral and contralateral arms on the fractionated components of patellar tendon reflex time. The subjects were 20 right-hand dominant college-age males. A Lafayette patellar tendon reflex apparatus was used to deliver a standardized stimulus to the ligamentum patella of the left leg. The impact of the stimulus hammer initiated a Hunter Klockounter and the sweep of a Medcraft EMG, which permitted the recording of total reflex time and reflex latency in milliseconds. Total reflex time was recorded as the interval between the impact of the stimulus and the instant the left heel was removed from a micro-switch. Reflex latency was measured as the interval between the presentation of the stimulus and the instant the EMG spike moved from the baseline. Motor time was determined by subtracting reflex latency from total reflex time. Maximal grip strength was determined prior to the assessment of reflex times. Following this the subjects were blindfolded and the reflex components were measured under normal conditions on each of 12 successive trials. Then, alternating within a balanced design, 48 trials were assessed under the four ipsilateral-contralateral, maximal-submaximal treatment combinations. Interclass correlations were computed to determine the reliability of the data. Analysis of variance procedures were used to contrast the effects of treatment conditions. An analysis of the results indicated that the Jendrassik maneuver facilitated total reflex time, with the maximum condition being significantly superior to the one-half maximum condition. The contrast of ipsilateral with the contralateral condition, however, was not significant. Similar results were found for the motor time component, with a high correlation between motor time and total reflex time being noted. Reflex latency under the maximum facilitation condition was found to be significantly faster than under the normal condition.

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April 8, 1978
3:15 pm

THE RELATIONSHIP BETWEEN AVAILABLE FORCE AND RESISTANCE. John Lisk, Linus Dowell, and Les Saunders, Texas A&M University.

The purpose of this study was to determine available force for external work in the human body as resistance varies. Subjects were six volunteer male graduate assistants in the Department of Health and Physical Education at Texas A&M University. Ages ranged from 26 to 45; weights from 143 to 177 pounds. A Universal Gladiator weight machine was utilized in subjects' executions of the bench press technique. Filming was accomplished with a Bolex Model H16 Reflex camera at a film speed of 58.5 frames per second. Film analysis was expedited by employment of a Bell & Howell Photo Reader Model 16-35 and a Vanguard Analyzer. Maximum bench press was defined to be that weight which could be pressed to full elbow extension. The initial press filmed for each subject was his defined maximum bench press. Thereafter each attempt was one unit (either ten or fifteen pounds, depending on what the actual weight was) less that the preceeding one. On the command "Lift", subjects were to exert a maximum effort in attempting to press the bar with accompanied weight to full elbow extension in as short a time period as possible. Two-minute rest interval periods were allowed between lifts. Available force was determined for the first six inches that the weight moved vertically for each resistance from maximum to 40 pounds. Available force was calculated by the formula $AF = R + \Delta F$ where AF = available force, R = weight and $\Delta F = m \cdot a$ i.e., Delta Force (Change in force) is equal to mass times acceleration. The available force values were plotted with the corresponding resistance for each subject, and a curve was developed. Group means for Delta Force and Available Force at each specific resistance were plotted. Relationships between Delta Force and Resistance; Available Force and Resistance; and Resistance and Acceleration were determined by product-moment correlations. The correlation coefficient between AF and R was found to be .73, between F and R was -.97 and between A and R was -.90. It was concluded that a positive relationship exists between amount of resistance and the ability to apply available force while a very high negative relationship exists between Delta Force and Resistance and between Resistance and Acceleration.

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April 8, 1978
2:00-5:00 pm
Poster #1

INFLUENCE OF VARYING LEVELS OF ISOMETRIC FATIGUE ON FRACTIONATED REACTION TIME COMPONENTS. G. Alan Stull, University of Minnesota; Jay T. Kearney, University of Kentucky.

The effects of varying levels of local muscular fatigue on fractionated reaction time (RT) components were determined for 20, young, adult males. Each subject's grip strength was tested; and following a two-minute rest period, the subject squeezed a hand-gripping device until a strength decrement of 20, 40, or 60 percent was recorded. At that point, the subject released his tension and 2, 3, or 4 seconds thereafter an auditory stimulus was presented. The subject's task was to react to the stimulus by gripping as quickly and forcefully as possible. Testing was also conducted under a non-fatigued state, and every subject was tested under all conditions. The stimulus was a buzzer, and the activation of the buzzer was recorded on the first channel of a polygraph. A second channel recorded the EMG from the hand-gripping muscles in the right forearm, and the tension exerted by the subject was recorded on the third channel. Total RT represented the interval from the initiation of the stimulus to the change in tension. This was divided into premotor time (PMT), which constituted the time from the stimulus to an alteration in the EMG, and motor time (MT) which was taken as the interval from the change in the EMG to the first sign of tension uptake. Analyses of variance failed to reveal any alterations in either RT or PMT; however, there was a significant ($p < .05$) elongation of MT when the muscle was fatigued. A significant F-ratio in the test for a linear trend revealed that as the fatigue level was intensified, MT tended to increase in linear fashion. Approximately 85 percent of the variability in MT caused by the effects of fatigue could be attributed to the linear component. The tests for the quadratic and cubic trends resulted in F-ratios which were not statistically significant. It was concluded that localized fatigue of this nature is primarily of peripheral (i.e., muscular) origin.

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April 8, 1978
2:00-5:00 pm
Poster #2

63

BIOMECHANICAL ANALYSIS OF JUMPING PATTERNS WITH RESPECT TO THE AGE VARIABLE. Marlene Adrian, Washington State University; Everett Smith, University of Wisconsin; Anne Klinger, University of Illinois, Chicago Circle.

The purpose of this study was to determine biomechanical characteristics of jumping patterns of women who are approaching retirement age or are retired. The subjects were thirteen women 58 years of age and older who were physically active in exercise, work or sport. Each subject was videotaped while performing three trials of vertical jumps for maximal height. An electrogoniometer was attached to the leg to record the angle at the knee joint. The subject stood on a rectangular platform which recorded the forces exerted upon the platform vertically, forward and backward, and laterally. Force-time recordings of the impulses in the three planes were obtained with the angle at the knee continuously recorded on the same record. Patterns of force-time histories were identified and compared to college age women's patterns. The ability to develop momentum sufficient to elevate the body's center of mass varied among the sample, but some of the women showed similar capabilities of that of a college age population. The body and body segment positions were compared with the force-time histories by means of the common reference (the knee angle) in order to discern causes of inability to exert mechanically ideal force-time patterns.

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April 8, 1978
2:00-5:00 pm
Poster #3

70

PRELIMINARY STUDIES: MOVEMENT EDUCATION PROGRAM DESIGNED TO REDUCE SEX ROLE STEREOTYPE AND SEX DISCRIMINATION IN GRADES K-5.

Chappelle Arnett, Kathleen Knutzen, Western Washington University

Purpose: The studies were designed for the first year of a two-year federally funded project ACTIVE, which is concerned with the development of materials for teachers of Physical Education. These studies were to assess the children's progress in accomplishment of the objectives and provide a basis for planning for second year. The specific objectives were to: 1) Assess project schools in meeting provisions for sex equity and reduce sex role stereotype and sex discrimination, 2) Determine the difference among fifth grade children (76 in project schools, 34 boys, 42 girls; 90 in non-project schools, 34 boys and 56 girls) on attitudes toward physical activity as measured by CATPA, 3) Determine the difference among fifth grade children (60 in project schools, 60 non-project) in changes or gain in physical fitness measures. Procedure: The assessment was conducted during April-May 1976 in schools in urban and suburban communities in Washington. The pre-test for fitness measures was done during October, 1976. The procedures for each study were as follows: 1) an independent evaluation group developed the observational rating form which was utilized in assessing sex equity; children's choices during physical education lessons, children's activities during free play observations were conducted in three project schools and in four non-project schools. 2) CATPA was administered in four project and four non-project schools. The scale includes six subdomains. A two-way ANOVA analysis was utilized to assess differences among schools, by sex and interaction. 3) Physical fitness changes among fifth grade was assessed by pre-post test comparison of the sample derived from project and non-project schools with comparable Physical Education program. ANOVA was employed to assess the differences in the changes of boys and girls. Results: 1) Following a limited number of observations, the observation scale was judged to be suitable for use and development of reliability. The program appears to be effective in providing for sex equity. 2) The analyses of the attitude scale revealed significant difference by schools and differences on the curl-up test in the project schools and no significant differences on the remaining tests. The program appears to be accomplishing its objectives in providing sex equity, however, additional observational records will be done; areas of attitudes and fitness among fifth grade children are satisfactory and will be continued to be studied.

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April 8, 1978
2:00-5:00 pm
Poster #4

CHILDREN'S BASKETBALL PERFORMANCE WITH REGULATION AND JUNIOR-SIZED BASKETBALLS. Kathleen M. Haywood, University of Missouri-St. Louis.

The smaller size and lower strength level of children may indicate that adaptations of sport-type games are necessary to maximize performance of skills. The effects on basketball performance of allowing children between 9 and 13 years to use a junior-sized rather than a regulation basketball were investigated. Children, 31 boys and 31 girls, were given two subtests of the AAHPER Basketball Skills Test, the Speed Pass and Front Shot, once with a regulation basketball and once with a junior-sized ball. The maximum first-to-fifth finger hand spread was also recorded for each subject. A subjects x sex x testing order x ball size (62 x 2 x 2 x 2) ANOVA indicated that the children performed the Speed Pass faster with the junior ball. After a preliminary analysis of the Front Shot Test indicated testing order was not a significant factor, subjects were divided into age groups, 9.0 to 10.5, 10.5 to 11.5, and 11.5 to 13.0 years, and a subjects x sex x age group x ball size (62 x 2 x 3 x 2) ANOVA, with subjects nested in sex and age group, was calculated. The youngest age group performed more accurately with the junior ball while the older children performed more accurately with the regulation ball. Boys also performed more accurately than girls. The mean hand spread of the children was 25% of the regulation-ball circumference but 27% of the junior-ball circumference, the later value comparing more favorably to those expected for adults using a regulation ball. Skill performance in basketball may be maximized for children, especially children younger than 10.5 years, by adapting the size of the basketball used.

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April 8, 1978
2:00-5:00 pm
Poster #5

THE PROFESSIONAL APPEARANCES AND CHOREOGRAPHIC WORKS OF ISADORA DUNCAN (1890-1927), Diane Milhan Pruett, University of Oklahoma

The professional appearances and choreographic range of American choreographer, Isadora Duncan, have in this paper been delinated so that further study of the dancer may have a chronological and quantitative base. The first portion of the research was a chronology which attempted to list all the professional appearances that Duncan made during her career on European and American stages from 1890 to 1927. The information included, whenever possible, records of the dance works included on the program, the route of the tour including date, city and theatre, the accompaniment, and the management. A listing of the choreographic works of Duncan, which formed the second part of the research, arranged the works by the name of the composer or author whose work provided the accompaniment for the dance. No one form was followed in this listing because of the diversity of the materials gathered. Materials gathered included: 1) movement descriptions of the dances, 2) critical reactions to the dances, 3) range of years the dance remained in repertoire, 4) structure of the choreography, and 5) Duncan's feelings about the works. Information for this paper was collected from biographies, articles, newspaper accounts, films, and special collections. Comprehending the full number of performances that Duncan gave and the full range of her choreographic endeavors presents a very striking image of the dancer. Isadora Duncan can be seen in this study as a prolific choreographer and performer striving to find and then to share with her audiences the "true dance".

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April 8, 1978
2:00-5:00 pm
Poster #6

RESPIRATION RATE IN A TENSION CONTROL CLASS. Marigold A. Edwards, University of Pittsburgh

Among the various techniques to modify stress is Progressive Relaxation, developed by Edmund Jacobson, and described in his book by that title (University of Chicago Press, 1929). From simply helping people to relax, he moved toward the more active Self Operations Control. The method consists of training in signal (EMG) detection and control and then routine signal monitoring in all daily activities. The objective is to match effort to task for personal efficiency in living. "Tension Control" is a 1-credit course offered to undergraduate students at the University of Pittsburgh providing the opportunity to learn this voluntary self-relaxation. Cultivated low arousal is a criterion step prior to using the skill in dynamic activities and applying it in real life situations. The physiologic changes accompanying such techniques are the opposite to those of sympathetic activation. Progressive Relaxation achieves much of its effects through a reduction in neural (electric) potentials in muscles. Since man is a psychobiologic unit, a generalized dampening of arousal is often evidenced. Respiration Rate, taken in the third session, was compared with rates taken 3 times during the 14-week course. Respiration Rate is part of the integrated physiologic stressor response and conversely reflects the trophotropic mode. It is very accessible and easy to count. The several scores show an overall decrease. The third session baseline score was taken at the end of a 25-minute relaxation practice. The class was instructed to count the exhalations during a 60-second period. The scores are suspect simply because each subject counted his/her own; it was a very informal data collection. The average number of exhalations for 60 seconds for the 25 men and women were 14 (range 9-19) for a baseline at the third session; 10 (range 5-15), 8 (range 3-12), and 7 (range 3-12) at intervals throughout the course. By the second and third data collection, some may have been approaching a maximum decrease, and therefore, the potential Respiration Rate decrease could have been inhibited by this lower limit. Decreases in Respiration Rate have been recorded for T M, Zen and Yoga, Autogenic Training, Hypnosis with suggested deep relaxation, and Sentic Cycles. It would appear that many students overbreathe, i.e., breathe in excess of task demands. It also appears that reducing breathing rate was well within the ability of these students. If Respiration Rate does reflect arousal level, the class showed evidence of modifying their arousal level downwards.

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April 8, 1978
2:00-5:00 pm
Poster #7

TOWARD A STRUCTURALIST APPROACH TO SYMBOLS IN DANCE. Christine Stevens-Jefcoate, University of Wisconsin-Madison.

The material in this study represents the groundwork for establishing a structuralist approach to symbols in dance. Although the structuralist approach has been utilized to great advantage in the examination of many fields of human endeavor, it appears that as yet it has not been applied to the exploration of dance symbols. The model for the type of work presented in this study is exemplified by Roman Jakobson's "Linguistics and Poetics" and Ferdinand de Saussure's "Course in General Linguistics." This work presents an objective methodology for identifying and classifying dance symbols, and it demonstrates the use of this methodology by applying it to two dances by choreographer Martha Graham. The two works choosen for this analysis are Night Journey and Appalachian Spring. Structuralism as used in this study is a form of rationalism whose prototype is represented by the works of Levi-Strauss. It is a methodology whose aim is to discover the common reality underlying a number of similar empirical examples. The Structuralist examination involves two fundamental activities: dissection and articulation. To dissect is to find within the whole certain fragments, and to articulate is to establish specific rules which govern the functioning of these fragments. Dissection and articulation interact to make possible the reconstruction of an object in such a way as to manifest the rules of functioning (functions) of that object. This study dissects certain observable dance symbols from the choreographic structure of the two Graham works, and classifies them according to a structuralist format. It also formulates a series of questions and definitions which specify the structural requirements governing each classification of dissected symbol. It is proposed that a clearer understanding of dance symbols as part of the dance art process can aid audiences, critics, and choreographers in their considerations of dance. This work does not deny that one can appreciate dance as a visual expression of movement or technique. One can, but, this point of view if necessarily limited and excludes the possibility for many philosophical intimations which may be contained within the piece.

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April 8, 1978
2:00-5:00 pm
Poster #8

EFFECT OF EXERCISE STATUS ON THE RESPONSE OF SELECTED BIOCHEMICAL AND PHYSIOLOGICAL VARIABLES TO NOISE IN ADULT MEN. Frank D. Bell, II, Indiana State University; A.H. Ismail, Purdue University; W.A. Cooper, Jr., Purdue University.

PURPOSE: The purpose was to investigate the biochemical and physiological response to noise in three groups of adult men classified as either chronic exercisers, beginning exercisers, or sedentary controls. PROCEDURES: Twenty-seven adult males classified according to age and levels of exercise status were used as subjects to investigate the effect of exercise status on the response of selected biochemical and physiological variables to noise stress. Data were collected at the beginning and at the conclusion of a four month exercise program, under each of two noise conditions (quiet and noise). In addition to age, height, weight and oxygen uptake estimates, the variables included in this study were: free catecholamine 24-hour volumes, pulse rate, systolic blood pressure, diastolic blood pressure and pulse pressure. The data were analyzed using univariate (analysis of variance) and multivariate (factor analysis and discrimant function analysis) approaches. RESULTS: 1) Noise stress resulted in significant changes in selected physiological and biochemical variables for the total group and particularly the exercise status group. 2) The responses of the individual status levels to noise were significantly different in terms of selected variables of interest. Chronic exercisers at the pre- and post-tests displayed similar responses to noise stress, while the sedentary controls were essentially unchanged in their responses. 3) Pulse rates and systolic blood pressure were the best discriminators between the status groups at the pre- and post-test, noise and quiet conditions. 4) The univariate and multivariate analyses were in complete agreement in terms of the results. CONCLUSIONS: 1) Noise stress significantly affected the responses of the variables of interest. 2) Exercise status was found to play a significant role in the response to noise stress.

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April 8, 1978
2:00-5:00 pm
Poster #9

DEVELOPMENTAL COMPARISONS OF KICKING PATTERNS. Jane E. Clark, University of Iowa; Sally J. Phillips, University of Wisconsin-Madison.

Researchers in motor development often are concerned with movement pattern comparisons of individuals of different developmental status. Quantification of the magnitudes of the observed differences and similarities rarely provided insight into the developmental changes occurring in the movement behavior. The present investigation has employed a methodological technique which provides greater potential for direct, quantifiable comparisons of observed kinematic parameters. To illustrate its usefulness, two subjects (a 5-year-old and adult male) were filmed (200 frames/second) kicking a ball with a running and one-step approach. Thigh and leg segmental angles of inclinations as well as the knee joint angle were calculated from the digitized x, y coordinates taken from the time the kicking lower extremity left the ground until impact. Smoothed displacement values were then normalized (set to unity) on the basis of: (1) elapsed time; (2) angular range; and, (3) both time and range for kicks within and between subjects. Normalization of the segmental and joint angle displacements provided direct comparison throughout the kicking motion. The equations for the obtained normalized displacement curves could then provide a quantifiable measure of the movement patterns. Although the unnormalized values and the product scores (e.g., ball velocities) revealed large differences between the 5-year-old and the adult's kick, normalization of the parameters suggested striking similarities between the one-step kicking patterns of both subjects. The same was not found for the running kick patterns. The results suggest that observed ball velocities differences in the one-step kick may be due to increased mass and lever length in adults and not to differences in the movement pattern of the kicking lower extremity. The implication of normalizing kinematic parameters of time and range in developmental kinesiological research is discussed.

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April 8, 1978
2:00-5:00 pm
Poster #10

A KINETIC COMPARISON OF THREE KARATE PUNCHES. Paul K. Smith, Florida State University.

The purpose of this study was to assess the differences in impulse, force, time of impact, striking mass, and velocity in the fixated, abducted, and unrestricted scapular punches of low and high skilled subjects. Such information is beneficial for the teaching of basic karate punching techniques to be of greatest value to the student. Twelve low skilled subjects, white belt level, and 12 high skilled subjects, black belt level, from 18-35 years of age punched a force transducer from a specially built stabilization device. In the abducted and fixated scapular punches, the subjects were stabilized to allow movement of only the appropriate body segments. For the unrestricted scapular punch, there were no external restrictions on the body. Punches were recorded via a force transducer, galvanometer oscillograph, and motion picture camera. A 2 X 3 design was used for the three punch types and two skill levels. MANOVA indicated differences for skill level and punch type with velocity and striking mass as dependent variables. Differences were found for punch type, but not skill level, on paired average force and time of impact. Discriminant analyses revealed none of the individual dependent measures to have sufficient F values to account for skill differences. Analyses of variance reflected differences on each punch type dependent measure. Newman-Keuls range tests demonstrated the abducted scapular punch to be higher on velocity and average force than the fixated scapular punch. The unrestricted scapular punch had higher levels of velocity than the other punch types but lower levels of striking mass and time of impact. Impact time displayed a significant skill level-punch type interaction, with the fixated scapular punch having longer impact times than the abducted scapular punch for the lower skill level. The high skill level group was 7 years older than the low skill level group, but only the unrestricted scapular punch and ages of low skilled subjects were correlated.

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April 8, 1978
2:00-5:00 pm
Poster #11

THE DEVELOPMENT AND VALIDATION OF A TECHNIQUE TO SEGMENTALLY LOCATE THE CENTER OF GRAVITY IN LIVING SUBJECTS. Michael W. Dumin, Radford College; Larry Good, Southern Illinois University.

Segmental center of gravity data were developed using living subjects. Sixty-four male and 34 female volunteer college age Ss were filmed lying on a 2 scale reaction board. Multiple linear regression was used to develop equations with the X and Y coordinates of the center of gravity located by the reaction board the criterion variable on 50 Ss. Age, sex, ht, wt, limb lengths, limb lengths/ht, somatotype, and joint coordinates were used as predictor variables. A cross validation study (Ss=48) compared the selected equations and Dempster's data predicting the center of gravity located by the reaction board (R^2X=.97, R^2Y=.98). The path of a diver's center of gravity was predicted (r=.99). The most parsimonious X equations used X coordinate data from the shoulders, wrists, hips, and ankles. The Y equations used the Y coordinate data from the shoulders, elbows, wrists, hips, knees, and ankles. Segmental center of gravity data can be gathered using a reaction board, photography and multiple linear regression, without knowledge of segment weights and centers of gravity locations.

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April 8, 1978
2:00-5:00 pm
Poster #12

JUVENILE-ONSET AND ADULT-ONSET OBESITY: PHYSIOLOGICAL AND PSYCHOLOGICAL DIFFERENCES. Jack L. Clasen, Louisiana State University.

The purpose of the study was to determine the relationship of juvenile-onset obesity (increase in fat cell number) and adult-onset obesity (increase in fat cell size) upon success in weight reduction and the change in psychological state in a behavioral self-control weight reduction program. Sixty-three obese individuals, including 48 juvenile-onset and 15 adult-onset, enrolled in a weight reduction program utilizing behavioral self-control techniques. The subjects were assigned to one of eight groups which met weekly for one hour for a period of 12 weeks. The meetings included nutrition education and Behavior Modification/Behavioral self-control techniques. Measures of weight, skinfold and psychological profile, utilizing the California Psychological Inventory, were administered on a pre- and post-test design. To be eligible, all subjects had to be at least 20 percent above ideal body weight. No significant differences were found in success or change in psychological profile of the juvenile and adult-onset groups. Although no significant results were found, further research in this area should be conducted. The present study was the first investigation in which psychologically normal, moderately obese juvenile and adult-onset subjects were divided into these two significant groups.

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April 8, 1978
2:00-5:00 pm
Poster #13

DOES PARTICIPATION IN A PROGRESSIVE RELAXATION PROGRAM IMPROVE THE SUSTAINED ATTENTION OF LOW ATTENDERS IN A CONTINUOUS PERFORMANCE TASK? William R. Giacalone, Marguerite Clifton, Purdue University.

It was the intent of this investigation to study the effects of progressive relaxation training on the sustained attention of low attending hyperactive children. Forty-five fourth grade children between the ages of 9 years 6 months to 11 years 2 months who exhibited hyperactive behavioral characteristics were selected as subjects. These children of normal or above average intelligence were tested on the Keystone Telebinocular test 12 for near point vision and then on the Continuous Performance Test to determine each individual child's attention span. Sixteen children were randomly selected to participate in the program of progressive relaxation. Fifteen children acted as the control group receiving no program of instruction. The program involved 40-minute sessions, five days a week for a three week time period. The progressive relaxation techniques incorporated in this investigation were revisions formulated by Bernstein and Borkovec (1973) of the original program advocated by Jacobson (1938). It was hypothesized that there would be no difference in performance between low attending control and experimental groups, with the experimental group receiving progressive relaxation treatment during the pre- to post experimental period. On the basis of a t-ratio test between means design, these hypotheses were supported since no significant differences at the .05 level were found.

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April 8, 1978
2:00-5:00 pm
Poster #14

ELECTROMYOGRAPHIC RECORDINGS ASSOCIATED WITH RAPID MAXIMAL FORCE PRODUCTION IN FIVE DIFFERENT MUSCLE GROUPS IN COLLEGE ADULTS. Alfred F. Morris, David H. Clarke, Andrew Dainis, Suzanne M. Beaudet, Department of Physical Education, University of Maryland.

It was the purpose of this investigation to monitor Electromyographic (EMG) changes in responding muscle groups as human subjects (Ss) were asked to make maximal voluntary isometric contractions (MVC). Procedure. Eleven college age males and eleven female students reported to the laboratory to be tested in MVC in five different muscle actions. The actions tested were knee extension, ankle flexion (dorsiflexion), wrist flexion, elbow flexion, and finger flexion. Standardized isometric strength testing protocol was followed. The mid position was the joint angle chosen for MVC determinations and all Ss were instructed to make a rapid MVC after a preliminary ready signal. Surface EMG activity was recorded by pen on paper set at a speed of 200 mm/sec. The major concern was to ascertain the time period between the beginning of EMG activity and the start of force production in each MVC. Results. A repeated measures multi-factor ANOVA revealed no significant difference between male and female EMG values so those findings were combined. The latent period in msec from the beginning of EMG activity to the initial force (MVC) readings for the various movements were:

Finger	Knee	Wrist	Elbow	Ankle
49.00	50.65	51.35	58.25	64.30

These findings indicated statistically significant ($P<.01$) differences among the EMG activity. Conclusions. These findings indicate that EMG activity preceding rapid MVC contractions are brief and in the order of 50 to 65 msec. Furthermore, the longer latency period (for ankle flexion) was concerned with an action not frequently considered as an easy human movement to make under the laboratory conditions imposed by these investigators.

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April 9, 1978
10:45 am

MUSCULAR PATTERNING IN SKILLED AND LESS SKILLED TENNIS SERVERS

Margaret B. Anderson, University of Arizona

The purpose of this study was to investigate by means of electromyography and tri-plane cinematography, the muscular patterning during the tennis serve of six skilled subjects (ball velocity $\bar{X}$ = 112.14'/s) and three less skilled subjects (ball velocity $\bar{X}$ = 91.28'/s). Each of the nine right-handed female subjects was filmed performing a minimum of six trials. The objective for each subject was to make a first serve into the right tennis service court. Three 16mm cameras, operating at 100, 64, and 64 frames/s recorded simultaneously the side, rear, and overhead views of each trial. Surface electrodes were used to record the electrical activity from two trunk muscles, four shoulder girdle muscles, and four shoulder joint muscles. The muscle activity was amplified by a six channel differential amplifier attached to the back of each subject, monitored on three osscilloscopes, and permanently displayed on an optical writing polygraph. A conical clock visible in all three camera views, provided a signal for time interval marks on the EMG record, and was used to synchronize the film data with the EMG data. Skilled tennis servers moved their body segments through a greater range of motion, moved their segments faster, and achieved higher mean racket head velocities ($\bar{X}$ = 105.3'/s vs $\bar{X}$ = 90.1'/s) than did the less skilled servers; however, the pattern of muscle activity did not show a difference between the skilled and less skilled servers. The wide variation in the manner in which all subjects initiated and sustained muscle activity during the preparatory phase, the more similar pattern in which muscles initiated and ceased their activity in the projection phase, as well as the role of muscles not sampled were suggested as possible reasons why no differences were observed in the electromyograms.

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April 9, 1978
11:00 am

PLATO FACILITATION OF FILM ANALYSIS IN BIOMECHANICS, David A. Barlow, Stewart Markham, James G. Richards, Biomechanics Laboratory, Department of Physical Education, University of Delaware.

Programmed Logic for Automatic Teaching Operations (PLATO) was developed at the University of Illinois in the 1960's. PLATO was designed to provide computer-assisted instruction (CAI) in teaching a variety of subject matters on many campuses recently. Recognized as one of the leading systems of teaching by computer, PLATO has the capability of individually instructing several hundred students at one time while carrying on two-way communications. This system enables the student to receive visual information in words, figures, graphs, pictures, and sounds. PLATO is therefore concerned with on-line use of computers by students to further individual learning, by teachers to supervise instruction, by programmers to prepare instructional material, and by researchers to study the optimization of learning. The purpose of this study was to explore a single additional application for PLATO in the realm of undergraduate research projects in the sport science of biomechanics. More specifically, an effort was made to determine the feasibility of using PLATO in the precision motion analysis of high speed cinematographical data. Nineteen students majoring in Physical Education at the University of Delaware were assigned research projects in biomechanics utilizating PLATO facilitation techniques. A 16MM Locam Camera, operating at 100 frames/second, was used to photograph students in the performance of a selected sport skill technique. Appropriate cinematographic techniques and procedures were followed to enable the assessment of selected kinematic factors of human performance. Initial film measurements, including the coordinates of 19 segmental end points of the human body, were acquired with the utilization of various manual and automatic digitizers. Ten PLATO terminals were then used to determine centers of gravity, joint angles, velocities and accelerations. In the past, one of the major limitations of student projects involving cinematography was the extensive amount of time required to complete the data analysis. The simplistic application of PLATO using CAI techniques resulted in the following benefits: (1) accurate data reduction; (2) tremendous increase in quantity of quantified film data; (3) considerable decrease in overall data reduction time; and (4) increased excitement in the conduct and understanding of biomechanical research. PLATO facilitation techniques obviously enhanced the quality of all research projects involving film analysis in biomechanics.

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April 9, 1978
11:15 am

GENERATION OF HORSEPOWER BY SPRINTERS AND DISTANCE RUNNERS AT SLOW AND RAPID TENSION. Donald E. Campbell, Oregon State University.

Horsepower of knee flexion and knee extension of seven sprint trained runners and seven distance trained runners was obtained at 60 and at 210 degrees per second by use of an isokinetic apparatus to test a hypothesis that no significant difference in horsepower would be manifested in sprint trained and endurance trained athletes at either of the two rates of dynamic movement. Critical ratio t and correlation coefficient were used to test the hypothesis. The data established that a significant difference in horsepower existed between the groups of runners and between the rates of dynamic movement. Distance runners developed greater horsepower at slow tension while sprint runners generated greater horsepower at rapid tension. The groups did not maintain the same horsepower relationship between knee flexors and knee extensors as rate of movement increased. Generation of knee extension horsepower by distance runners was more dependent on muscle strength than on speed of movement while generation of knee extension horsepower by sprint runners was more dependent on speed of movement than muscle strength. Sprint runners used a greater percentage of knee flexion strength for the generation of horsepower than did distance runners.

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April 9, 1978
11:30 am

IS RADAR A SURE TICKET TO ACCURATE BASEBALL VELOCITY RECORDINGS?

Jack A. Sanders, Indiana University (Post-doctorate)

The purpose of this investigation was to determine the relationship between baseball velocity recordings derived from film analysis, a radar gun, and a laser beam apparatus. The subject was a member of the Indiana University varsity baseball team. The first 27 of the 50 recorded throwing trials were filmed. Two velocity scores were determined for each filmed trial using a Model P-40 Recordak. One method (Film 1) used a time factor derived from a large .01 second interval clock. The other method (Film 2) used a time factor based upon the camera's frame rate indicator. A laser beam apparatus produced a third velocity score. Interruption of the beam by the thrown ball activated a digital clock, and target impact deactivated the clock. The fourth velocity score was derived from a Speed-Gun 8 radar gun from CMI, Inc. Ball velocities from the four methods were correlated. Nineteen trials resulted which were filmed and were also free of any instrument error. The correlation coefficients were as follows: Film 1 vs Laser = .941; Film 1 vs Radar = .901; Film 1 vs Film 2 = .924; Laser vs Radar = .965; Laser vs Film 2 = .988; Radar vs Film 2 = .958. The means for the groups were 58.34 mph (Film 1), 56.42 mph (Laser), 58.21 mph (Radar), and 71.72 mph (Film 2). Laser beam scores were correlated with radar gun scores (N=42), and a coefficient of .985 resulted. The means were 63.43 mph and 64.16 mph respectively. Coefficients which resulted from a comparison of scores from 26 filmed trials with the laser beam values were as follows: Film 1 vs Laser = .935; Film 2 vs Laser = .986. The means for the groups were 63.64 mph (Film 1), 79.38 mph (Film 2), and 61.80 mph (Laser). The following conclusions were drawn relative to the findings: 1. For biomechanical studies and intercollegiate athletics, the best overall method for obtaining projectile velocities is the radar gun. 2. Film analysis, the laser beam method, and a radar gun can provide highly accurate velocity determinations when exact procedures are followed. 3. A coach can use analysis of 64 fps film to determine accurate ball velocities when a precise time determining instrument is available. Manufacturer's camera frame rate settings may not be sufficiently accurate to provide valid velocity determinations.

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April 9, 1978
11:45 am

LONGITUDINAL CHANGES IN STRIDE LENGTH AND STRIDE RATE OF CHILDREN RUNNING. Shelley Ann Smith, University of Northern Iowa.

Since 1962, four girls and three boys have been filmed in an investigation of "Ontogenetic Development in Selected Motor Tasks" directed by Dr. Lolas E. Halverson and Dr. Mary Ann Roberton of the motor development and child study center in the Department of Physical Education and Dance at the University of Wisconsin-Madison. As three-year-olds, children were added to the study at intervals of approximately three years, forming a set of time-lag case studies. Cinematographic running data for three girls and two boys from the longitudinal investigation became the focus of the current study. The current investigator identified key frames showing foot contact and take off during running strides and calculated ground contact times and stride times. Running velocity was the product of stride length which was measured from the film, and stride rate, the inverse of stride time. Analysis of the data accumulated over six to eleven years revealed stride rate and stride length relationships common to all five children. The greatest changes over time occurred in stride length rather than stride rate. Before the subjects were nine years of age, stride rate seemed to contribute more to running velocity than stride length. After the subjects were eleven years of age, stride length appeared to contribute more to running speed than stride rate. The running velocities of the children studied longitudinally were comparable to the data reported in cross-sectional studies of children sprint running.

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April 9, 1978
12:00 pm

A COMPARISON OF MAXIMAL EXERCISE TEST PROTOCOLS OF IDENTICAL WORKLOADS BUT VARYING DURATIONS OF EXERCISE STAGES IN FEMALES.

Paul S. Fardy, St. Catherine Hospital; Mark H. Gibbons, University of Wisconsin; G. David Beiser, St. Catherine Hospital; Robert Johnson, Purdue University.

Physiological responses were compared among maximal exercise test protocols of varying durations of exercise stages. Three maximal treadmill test protocols were compared in twelve normal females, age, $\bar{x}$ = 22.1 years; height, $\bar{x}$ = 64.6"; and, weight, $\bar{x}$ = 126.4 lbs. Each subject was tested on four occasions, the initial test being a pre-trial for the purpose of test familiarization and reducing anxiety. The three tests compared were assigned randomly and consisted of one, two and three minute exercise stages of identical workloads. Stage 1 was the equivalent of 2 METS workload and subsequent exercise stages were each increased by 1 MET. Maximal variables compared included heart rate (HR), oxygen uptake ($\dot{V}O_2$), systolic blood pressure (SBp), respiratory exchange ratio (R), lactic acid (LA), physical work capacity (PWC), and perceived exertion (PE). In addition, regression equations were developed to compare measured $\dot{V}O_2$ max to predicted $\dot{V}O_2$ max, utilizing age predicted maximal heart rate and attained maximal heart rate, respectively, as criterion variables. Analysis of variance statistical procedures were utilized for among group comparisons. No significant differences were obtained among test protocols in maximal HR, SBp, $\dot{V}O_2$, R, LA or PE ($p < 0.05$). Maximal PWC was significantly greater in the one and two minute protocols. Furthermore, test time was significantly shorter with 1 minute stages (average time - 13.9 minutes) compared to 2 minute (22.8 minutes) and 3 minute (31.2 minutes) stages. There were no significant differences among measured $\dot{V}O_2$ max and predicted $\dot{V}O_2$ max tests, although when using age predicted maximal heart rate (220-age in years) as the criterion, the predicted value was higher in every case (mean difference - 10%) compared to predicted $\dot{V}O_2$ max utilizing attained maximal heart rate. Findings suggest that there are no significant differences in maximal physiological responses with test protocols of varying durations of exercise stages. From a practical viewpoint, however, testing time is reduced significantly when utilizing shorter exercise stages.

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April 9, 1978
12:30 pm

THE FUNCTION OF AGE, SEX AND BODY MASS ON DISTANCE RUNNING.

James R. Morrow, Jr., Univ. of Houston; Andrew S. Jackson, Univ. of Houston; John A. Bell, Univ. of Houston.

A systematic random sample of school age children (ages 10 through 17) was selected from the Texas Fitness Test data. Data were analyzed with ANOVA and multiple regression techniques in order to determine the function of sex, age, and body mass upon distance run in nine minutes for ages 10 through 12 and twelve minutes for ages 12 through 17. Results indicated that there was a significant sex difference with males performing better than females on both runs. There was not an age effect for the females nine minute run while the age function for the males nine minute run was positive. Twelve minute results indicated a significant quadratic trend for males with a minimum at age fifteen. Body mass index was then used as a covariate in a stepwise analysis to determine its effect on performance in conjunction with age. In all subsamples, there was a significant relationship between the body mass index and performance. For females, age accounted for no significant increase in variation. The linear trend for males nine minute results and the quadratic trend for males twelve minute results remained significant. Results were different than those depicted in the AAHPER Youth Fitness Test Manual for the 600 yard walk/run test where graphs indicate a positive relationship for males and only a slightly positive or zero relationship for females. This probably occurs because of the speed component being measured with the 600 yard walk/run. The negative trend for females and the quadratic trend for males on the twelve minute run identify programmatic concerns at the high school level of required physical education.

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April 9, 1978
12:45 pm

RELIABILITY AND VALIDITY OF SELECTED FIELD TESTS OF AEROBIC POWER IN YOUNG WOMEN. Douglas Garfield, Syracuse University; Edmund J. Burke, Ithaca College; Jean Tuffy, Ithaca College.

The purpose of this study was to assess the reliability and validity of the 600-yard run, 9-minute run and 12-minute run in female high school students. Of the 33 individuals who originally volunteered to participate in the study, 29 female high school students with the following characteristics served as subjects: age, $\bar{X}$ = 16.07, SD = 1.05 years; ht, $\bar{X}$ = 164.01, SD = 5.64 cm; weight, $\bar{X}$ = 56.16, SD = 8.05 kg. Each subject was administered a 600-yard run, 9-minute run, 12-minute run and a discontinuous, progressive treadmill test of VO_2 max. In an attempt to establish the reliability of the field tests, each subject was randomly assigned to one of three groups, each repeating one of the three field tests. Mean values indicated that the young women in the present study were well-motivated and above average in each of the measures of performance as follows: 600-yard run (sec.), $\bar{X}$ = 130.73, SD = 17.47; 9-minute run (yds.), $\bar{X}$ = 1845.24, SD = 195.77; 12 minute run (yds.), $\bar{X}$ = 2407.31, SD = 238.99; VO_2 max L/min, $\bar{X}$ = 2.34, SD = .32. Utilizing intraclass correlation coefficients as indicators of reliability, each field test was found to have satisfactory reliability as follows: 600-yard run, R = .990; 9-minute run, R = .964; and 12-minute run, R = .927. In an attempt to assess the validity of each field test of aerobic power, Pearson product-moment correlation coefficients were obtained between VO_2 max ml/kg min -1 and each of the field tests as follows: 600-yard run, $\underline{r}$ = .724; 9-minute run, $\underline{r}$ = .808; 12-minute run, $\underline{r}$ = .772. Tests of significance were computed between these correlation coefficients utilizing a method described by Hotelling. No significant difference ($P \not< .05$) was found between correlation coefficients indicating a similarity in the validity of each field test of aerobic power. Motivating devices employed and the importance of adequate motivation for validity of performance based field tests is discussed. It was concluded that in well motivated high school aged women, each field test employed was both reliable and valid. Due to its superior administrative feasibility, the 600-yard run is recommended as a field test of aerobic power for the mass testing of young women.

Doug Garfield
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April 9, 1978
1:00 pm

AN INVESTIGATION OF THE INVERTED U HYPOTHESIS OF WARM-UP IN COLLEGE WOMEN. Harold B. Falls, L. Dennis Humphrey, and Melvin V. Foster, Southwest Missouri State University.

Thirteen varsity athletes served as subjects. Their mean physical characteristics were age: 21.6 yr; ht: 166.7 cm; wt: 57.7 kg; max $\dot{V}O2$: 43.6 $ml \cdot kg \cdot min^{-1}$; max HR: 187; and % fat: 17.5. Each subject completed a criterion task (CT) after 6 different prior exercise conditions -- no warm-up (WU) and 10 min WU that were adjusted in intensity to be at 30, 40, 60, 80, and 90% of the difference between resting and max HR. The CT was a 6-min bicycle ergometer ride at workloads estimated to require 105-122% of max $\dot{V}O2$ ($\bar{x}$=114%). The workloads were individually adjusted for each subject and ranged between 1080 and 1440 kgm/min. Initial pedalling speed was 60 rpm. Resistance was kept constant through out the 6-min period. The supramaximal load was chosen to insure that each subject could not maintain the initial pedalling cadence for the full 6 min but be of low enough intensity so that all subjects could complete the ride. Two min rest seated on the ergometer was allowed between the end of the WU and the beginning of the CT. Data collected were total pedal revs each 30 sec, HR, and $\dot{V}O2$ during the CT. Results on performance and $\dot{V}O2$ are summarized in the following table:

	Intensity of Warm-up					
	None	30%	40%	60%	80%	90%
Total Pedal Revs, 6 min	320.8	322.6	325.3	330.9	323.5	306.2
Total $\dot{V}O2$ 6 min, liters	14.64	14.92	14.77	15.41	15.68	16.08

Performance after the 60% WU was significantly better than after 90% or no WU (p=.05). Data on HR showed a positive correlation between prior exercise intensity and (1) HR acceleration during the first two min of the CT; and (2) the final HR level reached during the CT. Performance during the CT (total pedal revs) generally followed an inverted U pattern with best performance coming after the WU at 60% intensity. The higher HR and $\dot{V}O2$ at the higher intensities of prior exercise (80 and 90% WU) suggest that performance should have been better under those conditions. It is postulated that performance was actually lower because of greater lactate accumulation resulting from the high intensity of WU. These latter data thus support a two-factor theory of WU.

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April 9, 1978
1:15 pm

POST-COMPETITION BLOOD LACTATE CONCENTRATIONS IN COLLEGIATE SWIMMERS. Ronald G. Knowlton, Michael N. Sawka, Daniel S. Miles, and Jerry B. Critz. Phys. Educ. Res. Lab. and School of Med.

No study has been published which quantitates the post-competition lactate concentrations of swimmers during a competitive meet. The purpose of this investigation was to quantitate the blood lactate concentrations of trained male swimmers during a competitive collegiate meet. Blood lactate was measured by an enzymatic method on 23 subjects 5 minutes after each race event. Comparisons were also made with lactate concentrations determined after maximal swims without opposition. The greatest mean lactate concentration of 25.7 mM was observed in swimmers after competing in the 200-yard individual medley. Swimmers in the 200-yard butterfly, back and free style events had similar mean blood lactate concentrations (ranging from 16.4 mM to 20.6 mM). Swimmers in the two longest events, the 500-yard and 1000-yard free style races, had mean lactate concentrations of 15.6 and 10.0 mM respectively. A decreased blood lactate concentration was noted in all swimmers competing in their third event or after the 1000-yard free style race. To account for the effects of motivation during the competitive meet, lactate concentrations were measured two weeks prior but after noncompetitive maximal effort, 100-yard and 200-yard swims. Correlations of $r=-0.21$ and $r=-0.20$ were found between swim time and lactate concentrations for the 100 and 200-yard noncompetitive swims respectively. Lactate production was slightly greater in conjunction with faster performances for the competitive as compared to the noncompetitive 100 and 200-yard swims. The results from this study demonstrate that competitive swimming requires a large participation from anaerobic metabolism. Competition was found to increase lactate concentrations and improve swim performance.

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April 9, 1978
1:30 pm

EFFECTS OF TWO LEVELS OF PHYSICAL TRAINING INTENSITY ON SELECTED MEASURES OF CENTRAL CIRCULATORY AND METABOLIC CAPACITIES IN 8-11 YEAR OLD BOYS. William F. Riner, Kirk J. Cureton and Richard A. Boileau, Physical Fitness Research Laboratory, University of Illinois at Urbana-Champaign.

The purpose of this study was to investigate the effects of five weeks of continuous running training at two different levels of intensity on the central circulatory (cardiac output and associated variables) and metabolic capacities (oxygen uptake and associated variables) of fifteen 8-11 year old boys. Pre-training maximal oxygen uptake values were used to establish individual running speeds corresponding to either 70% or 80% max $\dot{V}O_2$. Eight additional subjects volunteered to serve as non-training controls for the study. Training was carried out four times per week with the distance run increasing from 2.5 kilometers per day in the first week to 3.80 kilometers per day the final week. Maximal and submaximal treadmill walking and running tests were used to evaluate circulorespiratory and central circulatory function. Analysis of covariance revealed significant increases ($p < .05$) in max $\dot{V}O_2$ (ml/kg BW $\cdot$ min) among the three groups only during the treadmill walking test. A Priori orthogonal comparisons showed this difference to be between the combined training groups and the control group. A significant decrease was found in maximal respiratory exchange ratios of the training groups compared to the control group. A significant decrease occurred with training in submaximal heart rate at a given work load only during treadmill running. The training groups showed significant decreases in submaximal respiratory exchange ratios and ventilation equivalents during a given treadmill walking load. Significant performance related changes were shown by an increased total treadmill walking time and decreased elapsed time for the 2.5 kilometer run for the combined training groups compared to the control group. It was concluded that the five week training program at an intensity of approximately 70% or 80% max $\dot{V}O_2$ was generally not sufficient to produce improvement in either circulorespiratory or central circulatory function in 8-11 year old boys. However, improved endurance performance was observed following the training program. Physical training at an intensity equivalent to 80% max $\dot{V}O_2$ did not alter cardiorespiratory function or physical performance by a magnitude significantly different from that observed in the 70% max $\dot{V}O_2$ intensity group.

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April 9, 1978
1:45 pm

CARDIO-RESPIRATORY AND PERCEPTUAL RECOVERY FROM A MARATHON RUN

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Six male runners (21-42 years) were examined before and after running the 1976 Boston Marathon to provide data concerning the cardio-respiratory and perceptual recovery from the performance. Treadmill runs, 30 minutes in duration, were administered 1 week prior to the marathon and 2-3, 6-7 and 13-15 days following. Treadmill speed was held constant and based on each runners planned race pace. Maximal performance data were collected 1 week before and 2 weeks after the race. Data were analyzed using a 2 way ANOVA (4 data collection periods and 3 exercise time points - 5, 15 and 30 minutes) and "t" tests. $\dot{V}e$, perceived exertion (RPE) and $\dot{V}O_2$ showed significant changes during the 30 minute runs. $\dot{V}e$ was higher 2-3 days after the race and 6-7 days following but not 13-15 days. $\dot{V}O_2$ (1/min) was decreased 13-15 days following the marathon. No significant changes were observed in the maximal data, i.e. run time, $\dot{V}O_2$ Max, HR Max and $\dot{V}e$ Max. Also, HR, BP, lactate, pyruvate, lactate/pyruvate and RQ were not significantly altered at any time following the race. It was concluded that increases in RPE and $\dot{V}e$ reflect the muscular discomfort experienced up to 1 week post-race. Also, cardio-respiratory efficiency does not appear to limit performance capacity following a marathon.

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April 9, 1978
2:00 pm

PULMONARY CHANGES DURING MARATHON TRAINING: A LONGITUDINAL STUDY

D.A. Kaufmann and E.W. Swenson, College of Physical Education, Health, and Recreation, University of Florida.

The purposes of this study were 1) to confirm whether there were any differences between observed scores and predicted scores based on age, height and sex in forced vital capacity (FVC), one-second forced expiratory volume ($FEV_{1.0}$), $FEV_{1.0}/FVC$ ratio, functional residual capacity (FRC), total lung capacity (TLC), FRC/TLC ratio, residual volume (RV), RV/TLC ratio, diffusing capacity of lungs for carbon monoxide (D_{CO}), alveolar-capillary permeability (k_{CO}) and alveolar volume (V_A) for two middle-aged men who trained for and competed in three annual 26.2 mile marathon races, and 2) to determine the magnitude and direction of changes in the observed scores for the three annual tests. The subjects, nonsmoking males, trained from 45 to 70 miles per week for 52 weeks during the three-year period. In the week after their annual marathon run they were measured in the above pulmonary variables. For the three-year period of training, subject A improved five pulmonary variables (TLC, FRC, FRC/TLC ratio, D_{CO}, and k_{CO}) and had small decreases in function of the other six variables. Likewise, subject B improved three pulmonary variables (FRC, FRC/TLC ratio and k_{CO}) and had small decreases in function of the other eight variables. Although statistical inferences from these data cannot be drawn, these results suggest that marathon training may be able to inhibit the deterioration of pulmonary function as predicted from regression with age in normal subjects.

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April 9, 1978
2:15 pm

RESPIRATORY AND METABOLIC ADAPTATIONS TO REPEATED BOUTS OF PROLONGED EXERCISE. Michael N. Sawka, Ronald G. Knowlton, and Jerry B. Critz. Physical Education Research Laboratory and School of Medicine, Southern Illinois University at Carbondale.

The purpose of this investigation was to compare two bouts of prolonged (80 min) submaximal (70% $\dot{V}O_2$ max) treadmill running spaced by a 90 minute rest for the effects of an endogenous heat load on the respiratory and metabolic adaptations of seven aerobically trained ($\bar{x}$ $\dot{V}O_2$ max 66 ml/kg) runners. All respiratory data was measured by open circuit spirometry. Blood lactate was measured by an enzymatic technique and acid-base data by the Astrup equilibration method. Rectal temperature was continually monitored by a telethermometer. Neither ventilation, $\dot{V}e/\dot{V}O_2$, or oxygen uptake significantly changed during (trend analysis) or between (dependent t test) the two prolonged runs. During the second run, respiratory exchange ratios (R) were lower ($P < 0.05$) than R values obtained at equal time intervals of the initial run. Oxygen pulse was lower at 65 min ($P < 0.05$) and 70 min ($P < 0.05$) of the second run. A constant mean blood lactate concentration approximating 2.8 mM was observed throughout both runs. An increased hypocapnia ($P < 0.05$) was measured throughout the second run when compared to the initial run. pH was also higher ($P < 0.10$) at the 80 min measurement of the second run. No differences were observed for PCO_2, HCO_3^-, or base excess during or between the two runs. Rectal temperature (Tr) increased linearly throughout both runs with terminal values of 39.7°C and 40.3°C respectively. With the exception of the 5 min measurement Tr was constantly higher ($P < 0.05$) by approximately 0.6°C during the second run. It was concluded that trained runners can maintain normal respiratory and metabolic adaptations to exercise despite the presence of a severe endogenous thermal load. The increased alkalosis and hypocapnia were concluded to be resultant from the increased core temperature exerting an increased ventilatory drive.

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April 9, 1978
2:30 pm

CHANGES IN $\dot{V}O_2$ MAX AND RUNNING PERFORMANCE WITH TRAINING.

C. Foster, J. T. Daniels and R. A. Yarbrough, Department of Health, Physical Education and Recreation, University of Texas at Austin, Austin, Texas.

This study was undertaken to determine the response of $\dot{V}O_2$max and of running performance (880 yards and 2 miles) to the onset of training in untrained individuals and to an increase in the volume and intensity of training in well trained individuals. In series A, $\dot{V}O_2$max and performances of 12 previously untrained individuals were determined before and after 4 and 8 weeks of training. In series B, performances, $\dot{V}O_2$ max and $\dot{V}O_2$submax of 15 previously well trained runners were determined before and after 4 and 8 weeks of intensified training. In series A, $\dot{V}O_2$ max increased during the first 4 weeks of training but failed to increase further even in the presence of an increased training load (50 total miles for the first 4 weeks, 80 total miles for the second 4 weeks). Running performance improved throughout the training period. In series B, neither $\dot{V}O_2$max nor $\dot{V}O_2$submax changed in response to greatly intensified training. Running performance improved throughout the experimental period. The results indicate that not all of the improvement in running performance subsequent to training is attributable to changes in $\dot{V}O_2$max. Further, the results indicated that changes in running economy are not a likely explanation for performance improvement among previously well trained runners. It is suggested that physiological adaptations not integrated in the test of $\dot{V}O_2$max might contribute to training induced improvements in running performance. The results also have significant implications regarding the interpretation of the efficacy of various training methods.

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April 9, 1978
2:45 pm

EFFECTS OF AN IMPOSED MYOTATIC STRETCH ON SERIAL ISOMETRIC CONTRACTIONS IN TRAINED AND UNTRAINED MEN.

Gary Kamen, University of Massachusetts, Amherst.

Previous investigations have indicated that maximal voluntary contractions performed with an imposed myotatic stretch on the contracting limb result in an increase in tension during the stretch above the level normally possible during a maximal voluntary contraction. Based on these findings, a study was conducted to determine whether high- and low- strength males would show different increases during the imposed stretch, and whether these increases would be maintained during a fatigue regimen. Each subject's knee extensor strength was measured at 145 and 130 degrees of knee extension. Following this, the imposed myotatic stretch treatment was given during which the subject began contracting isometrically at 145 degrees. After two seconds, a constant torque motor delivered a 1-second stretch to pull the limb back to 130 degrees of extension where the subject maintained the contraction for two seconds. Finally, each individual performed a series of thirty maximal isometric contractions (5-second contraction, 10-second rest). On one of the two test days, an imposed stretch was delivered during each contraction. The exact number of trials to be performed was not disclosed to the subject, but he was told that only two remained after completing 28 trials. Results showed that both groups exhibited significant increases in strength of approximately 10% during the imposed stretch. A similar jump in tension was seen during each trial of the fatigue series using an imposed stretch. In addition, although both groups showed an increase in strength on trials 29 and 30, this increase was about twice as large for the high-strength subjects, than for the low-strength group. Analysis of recovery trials indicated that 10 minutes was sufficient time to effect a 90% recovery in strength for both groups. It was concluded that stretching a limb during a maximal isometric contraction results in an enhancement of tension output, a "supramaximal" contraction. This increased tension is maintained during a fatigue regimen.

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April 9, 1978
3:00 pm

ABSTRACT

MOTOR DEVELOPMENT OF THE INFANT MENTALLY RETARDED.
David M. Auxter, Slippery Rock State College.

The purpose of this study was to determine the efficacy of instructional procedures for facilitating the rate of motor development of an infant with Down's Syndrome. The instruction was in conformance with P.L. 94-142 Individual Education Program. (I.E.P.) The subject for this study was a six month old child who was diagnosed as Down's Syndrome by medical personnel. The initial level of motor performance was age 2 months as measured by the Bayley Motor Development Scale. The motor development quotient of the child at inception of the program was .33. Intensive programming was conducted through task analytical procedures of each developmental task on the scale which related to upright locomotion. The present levels of educational performance were determined on each specific task on the scale. Short term instructional objectives were then postulated to extend present levels of educational performance; thus, on going assessment of short term instructional objectives (STIO's) attained enabled stringent monitoring of projected development of the child. The program was conducted 45 minutes per week. The parent was trained in each session to extend the program into the home to achieve target objectives each week. The program continued until the child could walk alone and demonstrated motor behavior commensurate of a 15 month old normal child. Pre and post test developmental quotients were compared to determine the influence of program intervention on the rate of motor development. The data indicated that there was facilitation of the development of the child as a result of program intervention with the Individual Education Program (I.E.P.) instructional procedures in the amount of 95% as expressed by the comparison of developmental quotients prior and subsequent to the 17 month treatment program. It was concluded that the instructional procedures incorporated in the I.E.P. of P.L. 94-142 can increase the rate of development of handicapped infants. It was also concluded that through such implementation procedures of keeping accurate records of present levels of educational performance, it was possible to communicate to parents training procedures which are effective for conducting programs which increase the rate of development of handicapped children.

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April 9, 1978
3:30 pm

THE RELATIONSHIP BETWEEN SELECTED PERCEPTUAL-MOTOR TESTS AND MEASURED INTELLIGENCE OF TRAINABLE MENTALLY RETARDED CHILDREN.

Robert E. Kraft, University of Delaware.

The purpose of the study was to determine the relationship between selected perceptual-motor tasks and the measured intelligence of trainable mentally retarded children. Five tests of perceptual-motor ability were compared with different levels of intelligence among 32 trainable retarded children. The selected tests included the figure-ground perception, kinesthesia, and standing balance with and without eyes from the Ayres' Southern California Sensory Integration Tests, and the imitation of movements and visual achievement forms from the Purdue Perceptual-Motor Survey. Children were grouped into intelligence categories based upon the Wechsler Intelligence Scale for Children.

The figure-ground perception test was designed to determine deficits in visual perception. The kinesthesia test was intended to measure the capacity to perceive joint position and movement with vision occluded. The imitation of movements attempted to measure neuromuscular control and translation of visual cues into movement. The visual achievement test determined form perception and spatial and constructional judgments.

Results of repeated measures analysis of variance revealed the following findings:

1. The higher intelligence group achieved greater scores in the visual achievement forms test at the .01 level and in the figure-ground perception test at the .05 level.
2. Results were non-significant when comparing intelligence categories with kinesthesia, standing balance with and without eyes, and imitation of movements.

Within the limitations of the study, it appears that a positive relationship exists between visual form perception, figure-ground perception and intelligence of trainable mentally retarded children.

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April 9, 1978
3:45 pm

AN APPROACH TO MAINSTREAMING THE HANDICAPPED CHILD WITH THE NON-HANDICAPPED CHILD. Michael A. Orfitelli, St. Ambrose College.

A comparison of the physical growth measurements, motor skill abilities, and social maturity age equivalency of normal, learning disabled, educable mentally handicapped, and trainable mentally handicapped children was investigated and treated both statistically and graphically to determine similarities and/or differences in the groups. Post-tests in physical growth measurements, motor skill abilities, and social maturity age equivalency were administered to each of the groups attending public schools and participating in a physical education program. The statistical results indicated that the groups were significantly different in most physical, motor, and social measurements; and that the differences seemed greater when the learning difficulties of the groups increased. However, graphic analysis indicated that certain individuals within each of the groups showed some similarities to their peers in the other groups toward development. In conclusion, based upon a graphic analysis, mainstreaming certain handicapped children with non-handicapped children can be accomplished for a variety of motor activities.

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April 9, 1978
4:00 pm

THE EFFECTS OF NEUTRAL, LIGHT, NOISE AND EXERCISE STIMULI ON ACTIVITY LEVEL AND LEARNING BY HIGH AND LOW ACTIVE LEARNING DISABLED CHILDREN. Carol G. Chasey, Executive Director, Northern Virginia Regional Education Service Agency

Hyperactivity has become a focal characteristic of research relating to handicapped children. Because it seriously interferes with learning, recent literature suggests that hyperactivity is the most detrimental characteristic a learning disabled child exhibits. The purpose of this study was to investigate the effects on learning scores and activity level of four conditions: (1) neutral stimulation, (2) light stimulation, (3) sound stimulation, and (4) pretask exercise stimulation. Subjects were initially classified high or low active as the result of baseline activity measures monitored on three separate days. Activity levels were measured by an ultrasonic motion detector, learning by scores on modifications of the Reitan Neuropsychological Test Battery. Two-way analyses of variance (baseline activity level x treatment) yielded no significant differences across experimental conditions for either activity level or learning. However, a moderately negative correlation between experimental activity level and learning resulted during condition 1 (neutral stimulation), a moderately positive correlation occured during condition 2 (light stimulation), a significantly negative correlation occured during condition 3 (sound stimulation), and a low negative correlation occured during condition 4 (pretask exercise), suggesting that there is not an invariate relationship between activity level and learning.

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April 9, 1978
4:15 pm

CHANGES IN UPPER EXTREMITY RANGE OF MOTION AND EFFICIENCY IN MULTIPLE SCLEROSIS PATIENTS DUE TO WATER ACTIVITY. Pamela Duthie, Washington State University, Pullman, Washington.

The purposes of the study were (1) to determine improvement in the linear range of motion of the shoulder, elbow, and wrist after a forty-five minute period of water activities and (2) to determine if the movement became more effective.

The test used was an overhand throw with a thirteen inch ball. The subjects were allowed practice throws before the pre-water tests. The two females had two pre and two post tests while the male had one of each.

The subjects were filmed with a Lo Cam Camera immediately preceding and following their normal aquatic programs.

A preliminary analysis using film tracings of the ball from the beginning of the power phase through the ball's flight was done (1) to determine if there were changes in ball velocity and (2) to determine the average force of the throw. Velocity and average force were determined by measuring vertical and horizontal displacements during the power phase and during the flight of the ball. The velocity and average force were computed using the standard motion formulas. The film was digitized using a Graphic Tablet and computations were done on a Hewlett Packard 25 Calculator.

The results showed that the average force increased by an average of 0.5365 pounds (2.4035 Newtons). The horizontal velocity of the ball increased by an average of 6.0706 feet/second. Average changes in range of motion in inches were: shoulder $h = -0.0321$, $v = 3.5112$; elbow $h = 2.8578$, $v = 3.5964$; wrist $h = 1.8878$, $v = 6.3885$.

It can be concluded that, except for the horizontal motion of the shoulder, range of motion, force production, and horizontal ball velocity increased. The specific reasons for the improvement cannot be attributed to the water activities alone. Other possible causes include Hawthorne Effect and water temperature.

Further research could provide more definitive reasons as to the benefits of water activities for Multiple Sclerosis patients.

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April 9, 1978
4:30 pm

THE EFFECTS OF VARYING TYPES OF REINFORCEMENT ON GROSS MOTOR SKILL LEARNING AND RETENTION IN TRAINABLE MENTALLY RETARDED BOYS.
Fred K. Schack, George Mason University.

The subjects of this study ranged in age from 14 to 17 and in IQ from 25 to 39. They participated in the two gross motor activities of bean-bag throwing and ring tossing. Each skill was presented twice a day, once in the morning and once in the afternoon, for twelve days. The multielement baseline design was used to analyze performance. Under this design four different treatment conditions were applied each day in an alternating sequence such that each treatment was presented only once per day. Each treatment was presented a total of six times per skill. The findings indicated that the overall treatment order for both skills, from the highest to the lowest ranked, was: Social plus Token Reinforcement, Social Reinforcement, Token Reinforcement, and Instruction only. Although learning did not seem to occur since there was no increase in response consistency, it was concluded that the subjects maintained their highest motor response consistency under the effect of Social plus Token Reinforcement. It was also concluded that the multielement baseline design appears to have a significant potential for research with a limited number of institutionalized mentally retarded subjects: (1) It allows for constant changing of the independent variable, hence the more believable the experimental control over the dependent conditions. (2) It may reduce by 2/3 the time necessary to conduct behavioral investigations by the two other prominent methods, the multiple baseline design and the reversal design.
Sincere appreciation must go to Dr. Terry Ryan, Cuyahoga County Schools, Ohio for his time and assistance in the conduct of this study.

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April 9, 1978
4:45 pm

THREE PROCEDURES FOR DETERMINING REACTION TIMES AND RELIABILITIES OF TRAINABLE MENTALLY RETARDED. Paul R. Surburg, The University of West Florida.

The purposes of this study were to measure by three methods reaction times of the trainable mentally retarded and to determine reliability coefficients by alternate procedures. Subjects were 35 trainable mentally retarded students from the Petree School in Pensacola, Florida. Intelligence quotients ranged from 33 - 62 (M=45); chronological age ranged from 9 - 19 (M=14). Subjects had good vision and were free of physical defects which might impede performance. Reaction time was measured from the onset of a light stimulus until a microswitch was activated. Microswitches were activated in the following ways: (1) depressing or (2) releasing panel mounted microbuttons or (3) depressing a hand held microbutton. Twenty trials with a one minute rest between trials 10 and 11 constituted a testing session. Four sessions were allocated for each type of microbutton. To eliminate the practice effect a Latin square method of testing was utilized. Reliabilities were calculated by the following methods: intraclass correlation, test-retest correlation and split-half method. Within the limitations of this study the following conclusions were derived: (1) reliability coefficients were low and caution should be exercised concerning subsequent analyses (2) no one method of measuring reaction time was superior in eliciting higher reliabilities (3) the three procedures for calculating reliability coefficients yielded markedly different values. Intraclass correlation coefficients were lower than the test-retest correlation coefficients.

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April 9, 1978
5:00 pm

A KINEMATIC ANALYSIS OF RUNNING PATTERNS OF MENTALLY RETARDED AND NORMAL BOYS. Dianne B. O'Brien and Larry A. Good, Southern Illinois University at Carbondale.

It was the purpose of this study to measure selected kinematic factors of running mongoloid and normal boys. Sub-Problem I was constructed to compare (t test) the two groups for the factors of average horizontal velocity, stride rate, stride length, elbow flexion, knee flexion, trunk lean, walk/run velocity, support time, and nonsupport time. Sub-Problem II was designed to determine the relationship (Pearson product moment correlation coefficient) between average horizontal velocity, stride rate, stride length, elbow flexion, knee flexion, trunk lean, walk/run velocity, support time, nonsupport time, and leg length. The researcher chose $P < .05$ as the level of significance. Cinematographic data was obtained for the six mongoloid and six normal subjects. The kinematic analysis was limited to the phases of running which depicted the running boys in the positions of (1) foot-strike, (2) foot-plant, (3) mid-support, (4) take-off, (5) follow-through completion, (6) forwar swing completion, (7) foot descent mid-point, and (8) foot-strike. The conclusions were: Sub-Problem I - The mongoloid boys were significantly different from the normal boys in the factors of average horizontal velocity, stride length, stride rate, elbow flexion, knee flexion, walk/run velocity, and support time. The mongoloid boys were not significantly different from the normal boys in trunk lean or nonsupport time. Sub-Problem II - There were significant correlations for the relationship of average horizontal velocity and stride length for the mongoloid boys and the normal boys. There also were significant correlations between average horizontal velocity and support time for the running normal boys.

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April 9, 1978
5:15 pm

190

A Comparison of Asthmatic and Non-Asthmatic Children on Measures of Self-Concept and Attitudes Toward Physical Education. J.Randy Routon and Claudine Sherrill, Texas Woman's University.

This investigation examined differences between asthmatic (N=50) and non-asthmatic (N=741) children on self-concept and attitudes toward physical education. Three instruments, The Way I Feel About Myself Self-Concept Scale, the Children's Attitude Inventory Toward Physical Education, and the Game of Pairs (a paired comparison inventory of school subjects), were administered to the fourth, fifth, and sixth grade children at three of the seven elementary schools in the Denton, Texas, Independent School District. Asthmatic and non-asthmatic children demonstrated no significant differences on the measures of self-concept and attitudes toward physical education. It was noted that both groups expressed favorable attitudes toward physical education.

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April 9, 1978
5:30 pm

THE EFFECTS OF EXERCISE ON SERUM LIPIDS AND LIPOPROTEINS IN GIRLS, AGES 8 TO 10 YEARS. Thomas B. Gilliam, The University of Michigan; Mary B. Burke, The University of Michigan.

The effects of a physical activity program on serum lipids and lipoproteins as coronary heart disease (CHD) risk factors were assessed in fourteen girls ranging in ages from 8 to 10 years. Post-absorptive blood samples were assayed for cholesterol, triglycerides, high density lipoprotein-cholesterol (HDL-C) and lipoprotein phenotypes before and following the training period. In addition each child received a densiometric determination of her body composition before and after the physical activity period. The physical activity program consisted of 40 minutes of exercise 5 times per week for six weeks. No significant differences were observed between tests on cholesterol and triglyceride levels. HDL-C values one day after the activity period was significantly ($P < .05$) higher compared to baseline values (36.4 mg% vs 30 mg%). The HDL-C: cholesterol ratio one day after exercise was also significantly higher than the baseline ratio and the ratio nine days after the exercise period. Three children were classified as having Type IV hyperlipoproteinemia before training. After training this abnormal lipoprotein pattern in two of these three children disappeared. In addition, Body composition analysis indicated significant changes in height, weight, and lean body weight. It was concluded that physical activity had a significant effect in raising HDL-C values in the young girls. Furtherfore, it appears that exercise may play a significant role in reducing elevated triglycerides in children.

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April 10, 1978
10:45 am

METABOLIC AND CARDIAC OUTPUT DIFFERENCES IN MALES AND FEMALES DURING MILD CYCLE ERGOMETER EXERCISE. Patty Freedson, Victor L. Katch, Stan Sady, University of Michigan.

To study sex differences in metabolic and hemodynamic responses to sub-maximum exercise, eight male and eight female subjects were matched on max $\dot{V}O_2$ ($l \cdot min^{-1}$ and $ml \cdot kg^{-1} \cdot min^{-1}$). Each subject performed one eight minute sub-maximum cycle ergometer test at 35 percent of max $\dot{V}O_2$ (300 $kgm \cdot min^{-1}$). At steady state $\dot{V}O_2$ (0.96 $l \cdot min^{-1}$) cardiac output was determined by a CO_2 rebreathing technique. Results indicated no significant differences in min-by-min, gross, or net $\dot{V}O_2$ between the sexes. Significant differences ($p < .05$) in cardiac output (males 1.75 $l \cdot min^{-1}$ lower), stroke volume (males 17.2 $ml \cdot beat^{-1}$ lower) and (a-v) O_2 difference (males 2.01 volume percent higher) were observed. When expressed independent of differences in lean body weight the above differences were no longer statistically significant. Sex specific differences in muscle mass and blood viscosity are discussed as possible mechanisms for exercise blood flow differences between males and females at constant load sub-maximum VO_2.

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April 10, 1978
11:00 am

THE EFFECT OF BLOOD INFUSION UPON ENDURANCE CAPACITY AND RATINGS OF PERCEIVED EXERTION. Melvin H. Williams, Ph.D., Old Dominion University; Mary Lindhjem, Old Dominion University; Rudolf Schuster, Norfolk, Virginia.

The purpose of this investigation was to study the effect of blood infusion upon maximal endurance capacity and ratings of perceived exertion (RPE). Sixteen long-distance runners, 13 of whom were marathoners, undertook four trials (T1-T4) of a treadmill run to exhaustion over a five week period. Criterion measures were time to exhaustion (TE) and RPE during each T. Data on Hb, Hct and RBCs were collected prior to each trial. Based on TE at T1, Ss were matched and assigned to either the experimental (E) or control (C) group. One week after T1, all Ss had 460 ml blood withdrawn. T2 was undertaken 2 weeks post-withdrawal. One week after T2, or 21 days postwithdrawal, the E group was infused with their own RBCs while the C group received 460 ml normal saline. T3 was taken 2 hours postinfusion and T4 one week later. The results of the factorial repeated measures ANOVA revealed no significant differences ($p < .05$) between groups for either TE or RPE, even though the Hb level for the E group was significantly higher ($p < .01$) than the C group at T3 and T4.

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April 10, 1978
11:15 am

EFFECTS OF SEVERE PRIOR EXERCISE ON ASSESSMENT OF MAXIMAL OXYGEN UPTAKE DURING ONE VERSUS TWO-LEGGED CYCLING. Bryant A. Stamford, Arthur Weltman, Robert J. Moffatt, and Charles Fulco, University of Louisville.

Physiological responses to consecutive (separated by seven min) continuous type one and two-legged maximal oxygen uptake ($\dot{V}O_2max$) tests have been studied on eleven male subjects. One-legged cycling tests were conducted as either two consecutive right (R) legged tests or a left (L) legged test preceeding a R. Measured variables included $\dot{V}O_2$, performance time, respiratory exchange ratio (R), blood lactate (HLa) concentration, core temperature (T_c), heart rate (HR), cardiac output ($\dot{Q}$), stroke volume (SV), and A-$\dot{V}O_2$ difference. $\dot{V}O_2max$ and performance time were significantly ($P < .05$) reduced from T_1 to T_2 in two-legged cycling. No reductions in $\dot{V}O_2max$ were found from T_1 to T_2 in either one-legged series. Performance time was significantly ($P < .05$) reduced in T_2 of each one-legged series; however, no differences were found between T_2 tests. Results indicated that severe prior exercise may affect two-legged cycling differently from one-legged cycling. In addition, limiting factors associated with T_2 performance in series L-R and R-R exerted similar influence in spite of the variation in protocol. HLa accumulation and $\dot{Q}$ were discussed as potential limiting factors.

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April 10, 1978
11:30 am

WATER-TRAINING AS A METHOD FOR MAINTAINING CARDIORESPIRATORY ENDURANCE IN ATHLETES. Charles J. Gatti, Washington University; R. John Young, Washington University; Harold L. Glad, Parkway School District.

The effectiveness of water-training in maintaining cardiorespiratory endurance was investigated in 16 highly trained cross country athletes, 18-24 years. Following a competitive season subjects were stress-tested (T_1) using a modified Astrand-Saltin treadmill test and divided into 3 equated groups based on $\dot{V}o_2max$. Group I (n=5) continued training as they had during the competitive season, Group II (n=5) underwent an experimental period of water-training, and Group III (n=6) detrained. The water-training group exercised in deep water for 40 min., 6 day/wk for 3 wks supported by a floatation device which permitted them to engage in a running type activity resembling their natural running form. All subjects were retested after 3 wks (T_2). A non-significant F ratio from an analysis of variance at T_1 confirmed the equality of the 3 groups in terms of $\dot{V}o_2max$. Analysis of covariance was performed at T_2 using T_1 $\dot{V}o_2$ max values as covariates and a significant ($p < .05$) F ratio was obtained reflecting a significant ($p < .05$) difference between the regular-training (57.18±1.01) and detraining (52.94±0.93) groups. The water-training group (54.57±1.01) did not differ significantly from the regular-training group indicating that the water-training program described was of sufficient intensity, frequency and duration to maintain $\dot{V}o_2max$.

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April 10, 1978
11:45 am

PHYSIOLOGICAL AND PSYCHO-PHYSICAL ALTERATIONS CONSEQUENT TO AN AEROBIC DANCE PROGRAM FOR WOMEN. Kathleen A. Rockefeller, Columbia University; Edmund J. Burke, Ithaca College.

The purpose of this study was to determine: (1) the energy cost and (2) the psycho-physical and physiological effects of an aerobic dance program in young women. Twenty-one college-age women participated 40 min per day, 3 days per week, for a 10-week training period. Each work session included a five min warm-up period, a 30 min stimulus period (including walk-runs) and a five min cool-down period. During the last 4 weeks of the training period, the following parameters were monitored in 6 of the subjects during two consecutive sessions: ratings of perceived exertion (RPE) utilizing the Borg scale, $\bar{X}$ = 13.19; heart rate (HR) monitored at regular intervals during the training session, $\bar{X}$ = 166.34 and estimated caloric expenditure based on measured VO_2 utilizing a Kofranzi-Michaelis respirometer, $\bar{X}$ = 289.32. Mean values during the 30 min stimulus period were VO_2 = 1.58 $l \cdot min^{-1}$, HR = 173.87 and RPE = 14.13. Expressed as a percentage of the post test $\dot{V}O_2$ max test, the $\bar{X}$ intensity during the 30 min stimulus period was 69.3 percent. Measures taken before and after the training period included: body weight in kg, a discontinuous, progressive bicycle ergometer test of $\dot{V}O_2$ max expressed in $ml/kg \cdot min^{-1}$, $\dot{V}_E$ max expressed in $l \cdot min^{-1}$, maximal working capacity expressed in KPM, submaximal heart rate and RPE at 300 KPM. MANOVA computed between pre and post tests for the six dependent variables revealed a significant approximate F-ratio of 5.72 ($p<.05$). Univariate t-test analysis of mean changes was performed as follows: $\dot{V}O_2$ max ($ml/kg \cdot min^{-1}$), $\bar{X}$ = 34.38 to 38.79, $p<.05$; $\dot{V}_E$ max ($l \cdot min^{-1}$), $\bar{X}$ = 58.27 to 67.62, $p<.05$; maximal working capacity (KPM), $\bar{X}$ = 700 to 876, $p<.05$; HR submax, $\bar{X}$ = 150 to 129, $p<.05$; RPE submax, $\bar{X}$ = 11.0 to 9.0; body weight (kg), $\bar{X}$ = 58.3 to 59.0, $p>.05$. It was concluded that the aerobic dance training program employed was of sufficient energy cost to elicit significant physiological and phycho-physical alterations in college-age women.

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April 10, 1978
12:00 pm

THE RELATIONSHIP BETWEEN BIORHYTHMS AND HUMAN PERFORMANCE.

Joseph Edward Donnelly, West Virginia University.

The purpose of this investigation was to determine if a relationship existed between biorhythms and human performance. The subjects were volunteers from the varsity swimming teams (N=24), rifle team (N=7), men's gymnastics team (N=11), women's gymnastics team (N=9), and physical education general program classes (N=31). Data was collected from official results of varsity participation or from laboratory testings. The laboratory testings consisted of 10 randomly scheduled sessions where choice hand reaction time and whole body movement and performance times were determined. Fifteen trials for each category were recorded and the mean scores from each session were used for statistical purposes. Biorhythms were calculated with the aid of a computer and compared to the performance scores of the athletes and general program subjects. The data were analyzed using Analysis of Variance for Unequal Sub-class Numbers. No comparisons were made between subjects or between groups of subjects. Each cycle was analyzed for differences between the positive versus negative phases and critical versus non-critical periods. Analysis for interaction between cycles was completed for the physical-emotional cycles, physical-intellectual cycles, and intellectual-emotional cycles. Significant F-ratios were found for the intellectual-emotional interaction (women's gymnastics) and physical-emotional interactions (general program hand reaction time), however, were not in accordance with the defined biorhythm theory. Significant F-ratios were also found in the intellectual cycle (whole body reaction and performance times) and were determined to be compatible with the theory. It was concluded that the differences found in the intellectual cycle represented inconclusive and insufficient evidence to support the theory of biorhythms in the parameters tested. Secondly, it was suggested that coaches, instructors, and behavioral scientists will not benefit from utilizing biorhythms when attempting to predict fluctuation in human performance.

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April 10, 1978
12:15 pm

PHYSIOLOGICAL CHARACTERISTICS OF CHAMPION SKIERS. Emily M. Haymes, Arthur L. Dickinson and Kenneth E. Sparks, Department of Physical Education and Recreation, University of Colorado at Boulder.

The purpose of this investigation was to examine the physiological characteristics of outstanding alpine and nordic skiers, both male and female. Members of the U.S. Alpine (N=12 men and 13 women) and Nordic (N=10 men and 10 women) Ski Teams participated in the study. Additional information was obtained from the 1977 NCAA Champion Ski Team (N=27 men). Measurements included height, weight, skinfolds, maximal oxygen intake, leg extensor strength, Margaria power run, vertical jump, response time, balance and agility (Barrow zigzag run). Comparisons were made between alpine and nordic skiers and between male and female skiers. Results indicate that male and female alpine skiers have significantly greater total leg extensor strength, power and agility than male and female nordic skiers. Male and female nordic skiers have significantly less body fat (%) and greater maximal oxygen intakes (ml/kg·min) than male and female alpine skiers. Male alpine and nordic skiers have significantly greater maximal oxygen intakes, power, total leg extensor strength and agility and less body fat than female skiers. Female alpine skiers have significantly faster response times than female nordic skiers. Male alpine skiers have significantly greater leg strength/body weight than male nordic skiers and female skiers. Compared to the NCAA Champion male skiers, female (U.S.) alpine skiers had significantly greater leg strength/body weight but less power and vertical velocity and more body fat. No significant differences were observed in leg strength/body weight between male (U.S. and NCAA) and female (U.S.) nordic skiers. The results suggest that differences in power and vertical velocity between male and female skiers may be due to factors other than static leg strength.

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April 10, 1978
12:30 pm

A DESCRIPTIVE ANALYSIS OF PHYSICAL EDUCATION TEACHING BEHAVIOR IN THE NATURAL ENVIRONMENT. Michael J. Stewart, Kansas State University.

This study was designed to examine teaching behavior of twelve physical education teachers in the natural environment and to describe relationships between that teaching behavior and selected presage and context variables. The subjects in the study represented both sexes from primary, intermediate, junior high, and senior high school levels. Subjects taught physical education in either urban or suburban public school settings. Direct observational recording techniques were used to collect the data. The observational instrument consisted of twenty-five teacher behavior categories and four climate categories. Prior to the actual study the instrument was tested for validity of behavioral definitions. Interval recording was the technique employed to record data. An audio tape recorder which was programmed for five-second intervals was used to ensure consistency. Observers who collected the data were five graduate students, all of whom participated in an extensive training program prior to collecting data for the actual study. Reliability checks were administered on all five observers on four separate occasions during the study. These reliability checks indicated that overall interobserver agreement was .88. Climate and teacher behavior data were analyzed for practical significance by calculating overall mean percentage of response for the four climates and twenty-five teacher behaviors. Spearman rank-order correlation coefficients were also calculated to determine possible relationships between independent and dependent variables. Based upon the analysis of the results, the following conclusions were drawn: (1) positive and negative teacher behavior decreases with grade level, (2) positive teacher behavior exceeds negative teacher behavior at all grade levels, both sexes, and both geographic locations, (3) male teachers demonstrate greater positive teacher behavior and less negative teacher behavior than female teachers, (4) surburban teachers demonstrate more positive teacher behavior than urban teachers, (5) suburban teachers administer punishment more than urban teachers, (6) teachers with eight or more years teaching experience demonstrate more positive teacher behavior than teachers with less than eight years teaching experience, (7) male teachers spend noticeably less time than female teachers in the management climate, and (8) elementary physical education teachers spend more time in the instruction climate than junior high and senior high school physical education teachers.

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April 10, 1978
3:30 pm

THE EFFECT OF OUTCOME INFORMATION ON THE ANALYTIC ABILITY OF GOLF TEACHERS. Gary S. Skrinar, University of Pittsburgh; Shirl J. Hoffman, University of Pittsburgh.

Twenty-eight experienced golf teachers, fourteen men and fourteen women, attending the 1976 National Golf Foundation Seminar for Teachers and Coaches, volunteered to participate in an investigation designed to evaluate the effect of performance outcome information on the analytic ability of golf instructors. The subjects were randomly assigned to one of two groups, one of which received no knowledge of performance outcome (NKO, n=12), while the other group was provided with a verbal description of the flight characteristics, direction, and distance the ball traveled, in other words, knowledge of outcome (KO, n=16). Teachers participating in small groups viewed three different golf swings six times each which were filmed from behind the golfer looking down the target line. The swings were filmed and viewed at normal speed (18f/s). Subjects answered six questions relating to each of the swings. The questions required the subjects to indicate whether or not critical body positions were attained (yes or no) during various phases of the swing and were the criteria used to determine analytic accuracy. The occurrence of movement events was validated on the basis of a frame by frame analysis by the investigator and a teaching golf professional. Immediately following each question subjects indicated on a seven point rating scale the confidence of their response. Statistical analysis of the data indicated that provision of performance outcome information did not significantly influence analytic ability or level of expressed confidence in accuracy of analysis of experienced golf instructors.

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April 10, 1978
3:45 pm

UTILIZATION OF MEASUREMENT TECHNIQUES BY STUDENT TEACHERS. James R. Morrow; Hally B. W. Poindexter, University of Houston.

Twenty-nine student teachers in physical education were asked to respond anonymously to forced choice and open ended questions regarding the utilization of measurement and evaluation techniques in the suburban schools in which they were completing their student teaching experience. Results indicated that while students felt that measurement techniques should be used in schools and that they would use them once they began full-time employment, such techniques were not widely used at the present time. Response patterns were generally similar across junior and senior high schools as well as the sex of the teacher. However, data do indicate that female physical education teachers utilize measurement and evaluation techniques more than do males. The university course identified as most valuable to students while involved in their student teaching experience was one in which they learned the skills necessary for completing written test items. Also seen as important were those courses related to secondary methods and introduction to teaching. Results indicate a need for better transition from the classroom to the school in the subsequent utilization of measurement techniques. Possible reasons for the present lack of utilization are: (1) overcrowded conditions, (2) lack of facilities and equipment, (3) departmental marking regulations, (4) coaching interests, (5) teacher complacency and (6) peer pressure exerted on new faculty. Based upon the data gathered from females, the effects of Title IX on coeducational instruction and females in leadership roles are discussed relative to professional responsibilities.

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April 10, 1978
4:00 pm

112

BEHAVIOR ANALYSIS INTERVENTIONS ON STUDENT TEACHERS' VERBAL SKILL FEEDBACK RESPONSES. Patt Dodds, University of Texas--Permian Basin, Odessa, Texas.

Student teachers' verbal skill feedback statements were acquired, increased, and maintained through a packaged behavior analysis intervention technique utilizing goal setting and instructions from the university supervisor, and self-cueing and self-recording by the student teachers. A single subject, N = 1 multiple baseline across behaviors was used to analyze the data. The behaviors under intervention were (1) general feedback ("good-bad" judgments rendered by the student teachers after students' movement skill performance attempts),(2) specific feedback (exact statements about the form or topography of the performance given in addition to the "good-bad" statements), and (3) value feedback (statements of reasons why the movement performance was "good-bad" in a product sense--i.e., what will it accomplish in a game situation?) was used to analyze the data. Results indicated that all three types of skill feedback could be acquired, increased, and maintained by applying this packaged intervention, and that causation could be attributed to the intervention package since each type of behavior changed only after direct intervention was applied to it. The investigator concluded that behavior analysis intervention jointly administered by the university supervisor and the student teacher is effective in changing verbal teaching behaviors such as skill feedback.

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April 10, 1978
4:15 pm

Analysis of Starting and Stopping Management for Elementary Physical Education Teachers and Their Students

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The purpose of this study was to objectively analyze the starting and stopping managerial activities of seven elementary physical education teachers and one of their respective classes during baseline and intervention conditions. Specific teacher and student behavior categories were observed with an inter-observer reliability of 93 percent by event, placheck, and duration recording procedures and were analyzed by behavior profiles and a multiple baseline design. Intervention consisted of a personal conference between each teacher and the researcher which included instructions, cuing and reinforcement, graphic feedback, and goal setting for one teacher behavior. Intervention occurred at varying points in time in order to ensure that changes in behavior were directly related to the intervention strategy. The following information was collected during baseline conditions: 1) The mean time that teachers spent talking during a starting management episode was 8.1 seconds while stopping required 4.9 seconds; 2) Mean student response latency time was 7.9 seconds for starting episodes and 9.0 seconds for stopping episodes; 3) Additional teacher managerial behaviors per class averaged 3.6 for starting episodes and 1.7 for stopping episodes; 4) The total number of positive teacher reactions to student management behavior was 1.5 for starting episodes and 1.9 for stopping episodes; 5) The total number of negative teacher reactions was 1.6 for starting episodes and .9 for stopping episodes; 6) The total number of starting episodes was 14 per session and 9.4 per session for stopping episodes.

Results of the study indicate that the intervention strategy was effective in modifying selected categories of teacher and pupil managerial behavior. This conclusion is supported by the following data: 1) Four of seven teachers made a large reduction in mean teacher talk time while two subjects made small reductions and one increased slightly; 2) Two of seven classes made large reductions in mean response latency time while four classes made small reductions and one class increased; 3) Four of seven teachers made a large reduction in the total number of management episodes while three made no change; 4) Five of seven teachers had no change in the number of additional managerial behaviors while two had large increases.

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April 10, 1978
4:30 pm

THE EFFECT OF VARIABLE DECISION-MAKING TEACHING MODELS ON ELEMENTARY AGE CHILDREN: MEASURES OF BODY COORDINATION AND SELF-CONCEPT. Mary C. Lydon, Quincy Public Schools and John T. F. Cheffers, Boston University.

The purpose of this study was to determine the effects of two different decision-making teaching models on the development of body coordination and self-concept of elementary age children. One Hundred and sixty three children participated in a physical activity program (experimental group) and seventy two comprised a control group. The experimental group consisted of two subdivisions: one where the teacher made all of the decisions for the students, and the other where students were given important choices amongst alternatives in an atmosphere of encouragement and challenge. The Cheffers Adaptation of the Flanders Interaction Analysis System (CAFIAS) was used to verify the treatments used in the study. Schilling's Body Coordination Test (SBCT) was used to test body coordination, and the Martinek-Zaichkowsky Self-Concept Scale (MZSCS) was used to measure self-concept. A two-by-three-by five ANOVA with planned comparisons was used to measure sex, treatment, and grade. Results indicated that there were no significant differences in body coordination between the two treatment groups which were, in turn, significantly different from the control group. No significant differences were found in self-concept across control and treatment groups. Body coordination and self-concept displayed no apparent decrement when students were given a share in the decision-making process. In spite of the fact that children on the decision-making day were given more freedom to choose the activity areas in which they would participate, no significant differences were found in the number of learning tasks completed by each of the experimental groups. Based upon the results of this study, the following conclusions were made: 1) The quality of student-teacher interaction was significantly different between the two experimental groups. 2) Both types of teaching were equally effective in improving body coordination as measured by the SBCT. Student decision-making did not lead to a decrement in body coordination. 3) Neither type of teacher behavior produced a significant effect upon self-concept as measured by the MZSCS. 4) No significant differences were found between males and females on either body coordination or self-concept. 5) The development of body coordination in children is a function of maturation; as grade increased, so too did performance on the SBCT. 6) Body coordination and self-concept are not related.

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April 10, 1978
4:45 pm

TEACHER FEEDBACK FOLLOWING CORRECT AND INCORRECT LEARNER RESPONSES. Donna Wiedenback, Ocala (Fla.) Public Schools; Shirl J. Hoffman, University of Pittsburgh.

Traditionally, descriptive analytic research has been limited to straightforward descriptions of teacher behaviors while the conditions which may give rise to these behaviors have been largely ignored. This study attempted to account for variations in teacher feedback patterns by manipulating the quality of the learner's response. Twenty physical education teachers were individually observed as they taught a student-accomplice an overhead volleyball serve in a simulated setting. Teacher behavior was classified according to a modified version of Fishman's (1974) system for recording augmented feedback. Results indicated that teachers emitted more feedback following incorrect than correct responses. A feedback pattern characterized by a "purely verbal" message that was predominately evaluative in its intent and almost always referring to the spatial dimensions of the whole movement was associated with correct learner responses. By contrast feedback following an incorrect response was most often a verbal message accompanied by a visual demonstration that almost always prescribed or explained how the learner should move on the next trial. It was rarely evaluative, was almost always focussed on the spatial dimensions of the movement and, while predominately whole-movement referenced, was more likely to refer to specific parts of the learner's response than was the case following a correct response. Descriptive feedback (messages which describe the nature of the learner's movements) was observed in only 3 of 367 instances of feedback sampled. It was suggested that the tendency for teachers to provide repetitive explanations of how the skill should be performed, as opposed to describing differences between desired and actual performance, may have been due to weaknesses in the diagnostic proficiency of the teachers studied. Certain feedback patterns specific to teacher sex and instructional level also emerged. Instances of auditory-tactile feedback were rare and almost all which were observed were emitted by secondary female teachers following incorrect learner responses. Affective feedback was supplied relatively infrequently by all teachers, never by elementary teachers following a correct response or by secondary female teachers following an incorrect response. By comparison, secondary male teachers were relatively liberal with their supply of affective feedback.

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April 10, 1978
5:00 pm

EFFECTS OF INSTRUCTION AND SUPERVISION IN INTERACTION ANALYSIS ON THE TEACHING BEHAVIOR OF STUDENT TEACHERS. Victor H. Mancini, Ithaca College; Harold L. Getty, Harwood Union High School; Harold H. Morris, Ithaca College.

To determine the effects of instruction and supervision in the practical application of coding interaction analysis on the teaching behavior of student teachers in physical education, 30 physical education student teachers enrolled at Ithaca College during the 1977 spring semester were chosen as subjects and were randomly assigned to either treatment or control groups. During the first five weeks of the semester, treatment group subjects participated in 15 hours of instruction and supervision in the practical application of Cheffers Adaptation of Flanders Interaction Analysis System (CAFIAS). The control group subjects received 15 hours of conventional supervisory feedback at the same time. All subjects were videotaped for an entire class three times during the semester: within the first three weeks of the semester, immediately after the end of the training sessions, and one month after the cessation of the training periods. Data for final analysis of teacher behaviors were collected during the second and third videotapings of each subject. A significant difference between the treatment and control groups were determined through the multivariate analysis of variance across the eight and six variables of CAFIAS. Univariate analysis of variance identified seven of the eight and two of the six CAFIAS variables that contributed significantly to the between groups difference. Stepwise discriminant function analysis indicated the variables in the order they contributed percent-wise to the significant between groups difference. These differences were evident after the second taping and were maintained for the third taping. The hypotheses were rejected, for significant difference in teacher behaviors of student teachers existed following 15 hours of training in interaction analysis and one month after cessation of the training period. This lends further support to the lasting application of interaction analysis on the teaching behavior of student teachers.

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April 10, 1978
5:15 pm

LISTENING COMPREHENSION IN RELATIONSHIP TO ACQUISITION OF MOTOR SKILLS. Dr. Diana Leapley, Whittier College.

The primary purpose of this study was to determine if a relationship existed between listening comprehension and achievement in motor skills. This study also compared listening comprehension and motor performance of male and female students. A subproblem was to determine if there was a relationship between the students' listening comprehension and IQ scores and motor performance and IQ scores. The subjects were 101 junior-senior high school students enrolled at Harold L. Richards High School in Oak Lawn, Illinois during the first semester of 1975-76. In order to determine if a correlation existed between listening comprehension and motor skill acquisition, a novel task was utilized as the measure of motor performance. The novel task selected for this study was a movement sequence encompassing three original skills designed by the author which were then incorporated with seven basic locomotor movements. A pilot study was employed to develop and refine the pattern and provide directions for its administration. The three new steps in the movement sequence were given easy to remember names, descriptive of the step involved; rocking horse, popcorn and frog. The sequence was designed to alternate four--then two--repetitions of each successive step, as well as alternating the direction of movement. The movement sequence was ultimately refined as follows. 1. Walk forward four steps. 2. Side step twice to the left. 3. Do the rocking horse four times. 4. Slide twice to the right. 5. Jump forward on both feet four times. 6. Do the popcorn twice. 7. Run backward four steps. 8. Walk sideward to the right twice. 9. Do the frog step forward four times. 10. Hop sideward twice to the left. The Brown-Carlsen Listening Comprehension Test was selected and administered to all male and female subjects as the measure of listening comprehension. Henmon-Nelson intelligence quotient (IQ) scores were obtained for all subjects through the director of counseling. Correlation coefficients and Mann-Whitney U Test statistics were analyzed and the following conclusions were drawn: 1. There was a low positive correlation between listening comprehension and movement performance, and between movement performance and IQ. 2. There was no significant difference between the scores of male and female subjects on the listening comprehension test but females scored significantly higher on the movement sequence. 3. There was a high positive correlation between listening comprehension and IQ.

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April 10, 1978
5:30 pm

CORONARY HEART DISEASE HEALTH EDUCATION FOR FAMILIES WHO EXHIBIT HIGH RISK FACTORS OF CORONARY HEART DISEASE. Joyce W. Hopp,Ph.D.,MPH; Irma Vyhmeister, Dr. P.H.; Grenith Zimmerman, Ph.D.; Richard Stevens, MPH. Loma Linda University School of Health [Loma Linda,CA]

This study explored the feasibility of educating school children with their families concerning the behavior change necessary to lower the known risk factor for coronary heart disease. Ibrahim had demonstrated that parents at high risk of coronary heart disease could be located with 71% accuracy by studying given parameters in high school children. Using this information, a Multiple Risk Index Factor was developed to rank the students in the 7th and 11th grades of the Yucaipa [CA] School District; this Index used the serum cholesterol level, ponderal index, blood pressure, skin fold, and presence of smoking, weighted according to information from the Framingham study. The highest 20 families in the 11th grade, and 40 families in the 7th grade served as the target group for intensive family education for a five-month period. Family members were then retested on the same parameters, and again six months later, following a period of no education or contact. A health behavior inventory and physical fitness test were also used in pre- and post-test examinations. In the areas of behavior known to be associated with increased risk of coronary heart disease, those families who chose to make changes achieved significant differences of behavior. Consumption of high-cholesterol foods, and levels of fat in the diet were reduced; regular physical exercise was increased; 80% of those who chose to stop smoking were able to succeed. 13% of the adults and 33% of the students achieved a 5% weight loss; 52% of the adults and 70% of the children achieved some weight loss. Over half of the families indicated that a family member had been most helpful in achieving behavior change. A follow-up study of similar format is being conducted in the 1977-78 school year with 4th and 5th grade students and their families, this time with a control group. Both studies indicate that this approach is able to reach those families at highest risk of coronary heart disease and assist them in achieving behavior change.

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April 11, 1978
8:30 am

A Study of the Relationship of Intraocular Pressure to Physical Fitness. Roger Sargent, Steven Blair, Jeffrey Magun, and Thomas Langley, University of South Carolina.

This study was designed to observe changes in intraocular pressure (IOP) of individuals undergoing prescribed exercise activity. It was hypothesized that improved physical fitness (as indicated by an increase in max $\dot{V}O_2$) would reduce baseline IOP readings. Subjects were male and female volunteers who were 21 or older, had IOP's of 18 mm Hg or higher, were on no medications, and had no current eye diseases. The test group (22 subjects) was randomly selected from a pool of 42 volunteers who met the above criteria and who showed no contraindications to exercise based on exercise screening and stress testing results. The test group exercised on a treadmill or bicycle ergometer three days per week at 65% of their max $\dot{V}O_2$ (as determined during stress testing using the Bruce protocol) for a 24 week period. The exercise consisted of two ten minute sessions for the first 12 weeks and three ten minute sessions for the second 12 weeks. The test group performed a submaximal stress test at the 12 week point and both the test and control groups were administered exercise screening and stress testing at the conclusion of the 24 week period. All data collected was subjected to a complete statistical analysis including multiple variant analysis. Measurements takenfollowing the 24 week testing period indicate an increased Mean max $\dot{V}O_2$ of 5.63% and a decrease in Mean IOP in both eyes (.88 mm Hg - right and .94 mm Hg - left) for the test group. The control group also demonstrated an increase in Mean max $\dot{V}O_2$ of .99% and a decrease in Mean IOP in both eyes (1.0 mm Hg - right and .92 mm Hg - left). None of these changes were significant at the .05 level. Correlations of per cent of change in max $\dot{V}O_2$ to amount of change in IOP revealed a significant r for both the left ($r = -.76$, significant at .01) and right eye ($r = -.54$, significant at .05) of the test group while r's for the control group (right = -.36 and left = -.13) were not significant. Even though the training protocol did not result in a significant Mean improvement in max $\dot{V}O_2$ for the test group, the results do indicate that the greater the increase in max $\dot{V}O_2$, the greater the decrease in IOP. Implications for studies which would increase the improvement in $\dot{V}O_2$ are obvious. It was also revealed during the course of this study that additional research concerning diurnal changes as they affect IOP, intensity of exercise, water retention, psychological state, and biochemical changes as they all relate to the training effect need to be conducted to better explain the relationship between IOP and physical fitness.

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April 11, 1978
8:45 am

THE EFFECTS OF SEVEN WEEKS OF DIETING AND INTENSE EXERCISE ON OBESE BOYS. Donald G. Scherrer and William Leach, University of Illinois at Chicago Circle.

The purpose of this investigation was to determine changes in weight, body composition, and cardiovascular conditioning in obese boys as a result of participating in a 7 week program under ideal conditions for making changes. The boys lived at a camp for the duration, where both their diet and periods of exercise were controlled. Their diet was maintained at 1250 calories per day. Their exercise program included daily sessions of running, swimming, weight training, and recreational games and activities. A significant weight loss from a mean of 176.5 to 146.44 pounds occured. ($p<.01$) The predicted per cent body fat was significantly reduced from 28.8 to 19.12. The greatest loss of weight occured during the first week of the program, 6.03 pounds. The range of weight loss during weeks 2 through 6 were from 4.92 to 4.12 pounds. The weight loss during the last week of the program was 3.83 pounds, significantly less ($p<.01$) than that of the first week. Skin fold measurements and girth measurements were taken from several areas, all showing significant changes, however when comparing the per cent of loss between areas, the results were not significant. Using a sub maximal bicycle test for predicting oxygen consumption, cardiovascular fitness was significantly increased. ($p<.01$) The number of miles run did not have an affect on the magnitude of weight loss, but did have an effect on the loss of per cent body fat and gain in cardiovascular fitness levels. The average number of miles run was 110.29, ranging from 256.5 to 62.0. The correlation between miles run and improvement in predicted maximal oxygen consumption was +.79 and in miles run with per cent fat loss was +.57.

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April 11, 1978
9:00 am

PHYSICAL PERFORMANCE COMPARISONS AMONG MARATHONERS AND UNFIT PERSONS OF DIFFERING AGES. Milan Svoboda, Portland State University

To examine the possible interacting influence of age and heavy endurance training on physical performance, comparisons were made among two distinct age groups of highly trained volunteers preparing to run a marathon and two groups of unfit volunteers of similar ages. Twelve younger marathoners (age = 27.9 ± 4.6 years), 11 older marathoners (age = 49.0 ± 6.6 years), 10 younger sedentary persons (age = 22.6 ± 4.7 years), and 13 older sedentary persons (age = 45.7 ± 6.7 years) served as subjects. The latter group consisted of older subjects who, while sedentary, were undoubtedly more fit than average for their age, as those volunteers who were unable to complete the bicycle test with a heart rate (HR) below 85% of their age-predicted maximal HR were eliminated for reasons of safety. Tests included: resting HR, HR response to a standard 6-minute bicycle ergometer test, toe-touch flexibility, triceps skinfold thickness, and maximal grip strength of the dominant hand. Weekly training averaged 61.7 ± 14.4 miles for the younger marathoners and 49.3 ± 9.5 miles for the older marathoners during the preceding two month period. Two-way ANOVA showed an increase in skinfold thickness as the only significant difference (.05 level) with age (8.92 mm vs. 12.44 mm for the young and old, respectively). Flexibility and grip strength scores were not significantly different across age or heavy endurance training. Resting HR (58.5 vs. 70.1 b/min), submax HR (114.5 vs. 141.6 b/min) and skinfold thickness (6.3 vs. 15.2 mm) were significantly lower (.01 level) in the heavy endurance training groups. No significant interactions between age and endurance training were found suggesting that while a selection process may be partly at play, age does not interact negatively in the typical response to endurance training.

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April 11, 1978
9:15 am

EFFECTS OF A 12-WEEK PHYSICAL CONDITIONING PROGRAM ON AEROBIC CAPACITY, BODY COMPOSITION, AND SERUM LIPIDS OF NORMAL AND OBESE MIDDLE-AGED WOMEN

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The primary purpose was to investigate the effects of a 12-week (4 day/week) physical conditioning program on aerobic capacity, body composition, and serum lipids (cholesterol and triglyceride concentration) of sedentary, middle-aged women. A secondary purpose was to clarify the influence of excessive body fatness on the conditioning response. Forty-two pre-menopausal, 29 to 47-year old, women volunteered, four were excluded and two dropped out, leaving 36 who completed the study - 23 obese (O) ($>$ 30% fatness, $\bar{X}$ = 38%) and 13 lean to normal (N) ($<$ 30% body fatness, $\bar{X}$ = 25%). The conditioning program included a 10-minute warm-up, 15 to 25 minutes of walking - jogging at an individually prescribed target heart rate corresponding to 75% of $\dot{V}O_2$ max, and a 5-minute recovery period. Maximal oxygen uptake ($\dot{V}O_2$ max) increased ($p < .001$) in both groups. The average increase in O was 15.0% and 18.9% and in N 12.6% and 12.7% when $\dot{V}O_2$ max was expressed in L/min and cc/kg·min, respectively. Body weight remained essentially unchanged in N, yet decreased ($p < .001$) in O. The sum of 10 skinfolds decreased significantly ($p < .001$) in both groups, but with a greater reduction in O. Hydrostatically determined percent fat and fat weight decreased slightly in N ($p < .05$) and more in O ($p < .001$) while fat-free body weight remained unchanged in both groups. The conditioning program had no effect on serum cholesterol and triglyceride concentration in either group. However, seven of nine high cholesterol subjects whose body weight decreased also showed decreases in serum cholesterol. High triglyceride subjects showed a similar trend, but the relationship with body weight changes was not as pronounced. Thus, a physical conditioning program of moderate intensity affected obese women and those of lesser fatness in a similar fashion. Quantitative differences were probably minimized by the effort to equate the exercise intensity level.

Supported by Grant AM08311 awarded by the NIAMDD, National Institutes of Health, Bethesda, Maryland

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April 11, 1978
9:30 am

THE USE OF SELECTED CIRCULORESPIRATORY FIELD TESTS WITH YOUNG CHILDREN: RELIABILITY AND VALIDITY.

Mark Loftin, Texas Eastern University.

The purpose of the present investigation was to determine the reliability and validity of three selected field tests (6 minute run-walk, 12 minute run-walk, and the 600 yard run-walk) which purport to indirectly estimate Max $\dot{V}O_2$. Fifteen untrained, apparently healthy children (8 boys, 7 girls; 9-11 years; $\bar{X}$ 9.7 years) were randomly selected for the investigation. The selected field tests were conducted on a regulation 440 yard track. The total yards covered in the allotted time period were recorded for the 6 minute and the 12 minute field tests, while the total elapsed time was recorded for the 600 yard run-walk field test. The Max $\dot{V}O_2$ (ml/kg/min) values were determined via a running protocol on a motor driven treadmill. The appropriate respiratory and metabolic data were obtained by use of a Beckman Metabolic Measurement Cart. A two week orientation period to field and treadmill testing preceded data collection. The subjects completed two trials of each field test and the treadmill run test. The test-retest reliability and validity coefficients of each test were computed by the Pearson Product Moment method. The validity coefficient of each field test was computed by correlating the highest Max $\dot{V}O_2$ values with the best run performance. The test-retest reliability coefficients of the 6 minute, 12 minute, 600 yard run-walk, and Max $\dot{V}O_2$ tests were .53, .54, .45, and .89 respectively. The validity coefficients between Max $\dot{V}O_2$ (ml/kg/min) and either the 6 minute, 12 minute, or 600 yard run-walk performances were .41, .78, and -.65 respectively. It was concluded that the 12 minute run-walk field test was the most valid of the selected field tests for this particular group of children. The low reliabilities of the field tests indicated that the children were not highly motivated and/or proficient in performing field tests of this type where a knowledge of pacing one-self is necessary. This finding might indicate that an orientation period longer than two weeks should be given before utilizing these field tests for the determination of circulorespiratory endurance of young children.

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April 11, 1978
9:45 am

CHANGES IN FITNESS PARAMETERS OF GOVERNMENT EMPLOYEES FOLLOWING AN EIGHT MONTH INDIVIDUALIZED EXERCISE PROGRAM.

D.L. Santa Maria, C.O. Dotson, University of Maryland.

A program designed to: (1) reduce cardiac risk factors and (2) to increase physical fitness levels was administered to employees of the U. S. Department of Justice. This purpose was to be achieved by (1) an initial and two subsequent tests (at 4 month intervals) of each participant's health and fitness status and (2) following the initial and second test, providing an individualized exercise program designed to increase fitness levels. A total of 286 subjects volunteered for the program and, of these, 112 (81 males and 31 females) completed the program. For each testing session, the following parameters were measured: body composition parameters - height, weight, skinfolds, waist circumference, and estimates of lean and fat weight, neuromuscular parameters - grip strength, sit-ups, vertical jump, and flexibility, and cardiovascular parameters - EKG, heart rate, and blood pressure while resting and during a graded treadmill exercise test, sub-max and max ventilation and oxygen consumption rates, blood cholesterol and triglyceride levels. The effects of the program on the above parameters as measured by group averages were classified as follows: no change - total body weight, cholesterol, triglycerides, systolic blood pressure, resting heart rate, slight change - decrease in triceps skinfold, percent fat, diastolic blood pressure, substantial change - increase in grip strength, sit-ups, hamstring flexibility, max O_2 consumption. It may be concluded that a fitness program of this nature can be expected to elicit changes in several important fitness parameters of apparantly healthy normal adults.

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April 11, 1978
10:00 am

AN EXAMINATION OF THE EFFECTS OF RANGE, FREQUENCY AND DURATION OF MOVEMENT ON RHYTHMIC SYNCHRONIZATION. Cynthia P. Ensign, University of Wisconsin-Madison.

Purpose of this investigation was to examine effects of differences in range, frequency and duration of movement on voluntary rhythmic synchronization. Rhythmic synchronization was defined as the capacity to coordinate two or more events in a space-time or rhythmic continuum. The coordination required was a knee action sequence of flexion and extension as a movement event with a series of metronome ticks as sound events. Based on a theory of rhythmic perception, rhythmic synchronization was assumed to depend upon sensory discrimination and anticipation. It was also assumed that such success would be revealed in the degree to which learned knee joint angles were reproduced (joint angle accuracy--JAA) and in the degree to which moments of arrival in their approximations were timed simultaneously with metronome sounds (time of arrival accuracy--TAA). Eighty female subjects were randomly assigned to eight treatment combinations. Two ranges of movement determined by angular distance between two target joint angles (TJAs), two frequencies of movement determined by metronomic rate and two durations of movement determined by movement quality established the combinations. Subjects performed four trials of five continuous flexion-extension actions to the metronome. A goniometer attached to a supporting knee registered joint angles. Its information and occurrences of metronome sounds were recorded on polygraph records. Both accuracy and consistency were calculated for JAA and TAA measurements. The average was found relative to each TJA in each trial. Error scores were then submitted to analysis of variance. Location of TJAs and metronomic rate were found to affect JAA, but angular distance and movement quality were not. For TAA metronomic rate was found to be the predominant influence. Movement quality and angular distance resulted in differences only at the lower metronomic rate. Location of TJAs was not found to affect TAA. Based on the results, effects of differences in range, frequency and duration of movement on rhythmic synchronization were discussed. Implications were offered with respect to the theory of rhythmic perception. Observable characteristics of movement such as those measured by JAA and TAA might be used by a mover and/or observer to evaluate success in rhythmic synchronization. Based on such information it would be possible to determine cues to develop and improve rhythmic synchronization.

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April 11, 1978
8:30 am

EXERCISE INDUCED ACTIVATION AND MULTIPLE CHOICE REACTION AND MOVEMENT TIMES OF FEMALES. C. Bennett Williamson, Paul R. Surburg, and Bruce A. Langford, The University of West Florida.

The purpose of this study was to determine the effect of exercise induced activation upon multiple choice reaction time and movement time. Twenty female volunteers from The University of West Florida participated in this study. Exercise induced activation was controlled by operating a motor driven treadmill at 3.2 mph and varying the degree of inclination (0-20% grade). A reaction time-movement time console consisting of five white lights displayed in a semi-circle with a six inch radius was mounted on the front of the treadmill. A red reaction time button was located in the center and equidistant from the movement time buttons. Subjects performed reaction time and movement time trials under six levels of HR: 80 (resting), 115, 130, 145, 160 and 175 bpm. Each subject received 20 trials at the appropriate exercise induced activation. For both reaction time and movement time the two best and worst scores were disregarded. Sums of the remaining 16 scores for each treatment were utilized in an ANOVA for repeated measures and trend analyses. No significant F values were found for the repeated measures ANOVA or for linear, quadratic or cubic trend analyses. Within the limitations of this study, exercise induced activation did not influence multiple choice reaction and movement times of females.

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April 11, 1978
8:45 am

THE EFFECT OF RHYTHMIC AND NON-RHYTHMIC CADENCE ON REACTION TIME SYNCHRONIZATION OF SEVERAL SUBJECTS. Paul Dunham, Jr., University of Wyoming.

The purpose of this study was to investigate the effectiveness of rhythmic and non-rhythmic cadence on the synchronization of reaction time of several male and female subjects. Subjects were employed in this experiment consisting of 12 groups of seven. Six of the groups were male and six female. The subjects were student volunteers from physical education activity classes. The reaction time apparatus employed in this study consisted of a T constructed of 2" x 4" pine. The stem was 20" and the cross piece 15" in length. Subjects were required to release a pressure switch mounted on the end of the stem and with the back of the hand knock over a 10" x 10" padded and hinged target attached to the cross piece. Upon reporting to the laboratory each group was assigned to react to either a rhythmic of non-rhythmic cadence. A cassette tape recorder was used to provide standardized instructions as well as the starting stimulus for both practice conditions. Subjects reacted to a starting number which was pre-stated before each trial. The starting numbers were exactly the same for both groups with only the rhythm with which they were presented varying. Each group was given 25 trials. Time was recorded on digital .01 second timers. The data was analyzed employing a 2 x 2 x 25 analysis of variance with repeated measures on the last factor. The results indicated that the performance of male subjects was superior to that of females $F(1.68) = 7.22$, $p < .05$. No significant difference was observed between rhythmic and non-rhythmic cadences $F(1.68) = .011$, $p < .05$. Also none of the interactions were significant The findings of this study do not agree with previously reported research which has concluded that differences between rhythmic and non-rhythmic starting cadences are significant.

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April 11, 1978
9:00 am

HENRY'S "MEMORY DRUM" THEORY OF NEUROMOTOR REACTION REVISITED.

John N. Drowatzky, Jeffrey C. McLellan, The University of Toledo

The purpose of this study was to evaluate motor program theories that hold motor skills are represented centrally and do not require peripheral feedback from prior movements to elicit suceeding movements. Eleven adult subjects were tested over 20 trials on each of six conditions: (1) finger lift off microswitch; (2) same movement, but 20 percent of the time no movement was made, i.e, "catch trial"; (3) a 33.5 cm movement terminated by the subject pushing an 8mm diameter button; (4) same movement with "catch trials"; (5) a longer movement requiring reversals and activation of two toggle switches terminated by the subject pushing an 8mm diameter button; (6) the long movement with "catch trials". The finger lift condition stood alone, no differences in RT were observed between the two movement conditions, and no differences were observed between the three catch conditions. The results of this study were interpreted to show that RT differences produced by either or both stimulus complexity and movement time are stimulus dependent rather than caused by selection of a motor program.

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April 11, 1978
9:15 am

STORAGE OF KINESTHETIC LOCATION INFORMATION DURING MOTOR SKILL LEARNING. T. Gilmour Reeve, Auburn University; Stephen L. Cone, Texas A & M University.

Theoretically, during self-paced movements sensory feedback is matched to a perceptual trace of the feedback associated with the correct response in order to detect movement errors. However, recent research findings in short-term motor memory have suggested that the individual does not store the specific location feedback cues but recodes that information based on a body coordinate system. The purpose of this study was to determine the storage characteristics of kinesthetic location information acquired during learning trials. Forty-eight blindfolded subjects learned to make a linear response with the right hand to a criterion location during 13 trials. Upon completion of the learning trials, subjects performed 10 trials without knowledge of results (KR) under one of four treatment conditions. These conditions were defined by the limb used for movement control and the feedback sources available. Specifically, the conditions were right-hand control with kinesthetic feedback, left-hand kinesthetic, right-hand visual, and left-hand visual. The data for the 10 no KR trials were analyzed in a 2 x 2 x 5 (limb x feedback x blocks of trials) analyses of variances (ANOVAs) with constant error (CE) and variable error (VE) as dependent variables. Results of the ANOVA for CE revealed that the right-handed and left-handed visual feedback groups made significantly longer response errors than did the kinesthetic feedback groups ($p < .05$). The trials main effect for CE was also significant ($p < .05$). Analysis of VE scores indicated that the visual feedback groups were significantly more consistent in their responses than were the kinesthetic feedback groups. No other statistical comparisons from the CE and VE ANOVAs were significant. The concept of a spatial-location coordinating system for the storage of kinesthetic feedback cues was supported by the similar performance scores of the right-handed and left-handed groups. A discrepancy in this system was identified when visual feedback was provided for controlling the movement to a location previously learned with kinesthetic cues.

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April 11, 1978
9:30 am

THE EFFECT OF AGE AND ACTIVITY LEVEL ON FRACTIONATED REFLEX TIME.

Priscilla M. Clarkson, University of Massachusetts

Numerous studies have reported increases in reaction time with ageing, yet only a few studies have dealt with the influence of age on reflex time. Since in no study has reflex time of old subjects been fractionated into a central component (reflex latency) and a peripheral component (reflex motor time), it was the purpose of this investigation to examine the effect of age on fractionated patellar reflex time. An additional focus was to determine the influence of a life style of physical activity on the reflex components of old and young subjects. Sixty male subjects were placed into four equal groups: old active, old inactive, young active, and young inactive. Young subjects ranged in age from 18 to 28 years; older subjects ranged in age from 55 to 79 years. Subjects were tested on two separate days; and on each day, two blocks of 10 patellar reflex trials were taken alternating between normal and Jendrassik conditions. A knee reflex hammer was dropped onto the patellar tendon, simultaneously activating a beam across an oscilloscope and starting a clock. The muscle action potential, which was picked up on the oscilloscope, provided a measure of reflex latency. When the subject's heel lifted off a microswitch, the clock stopped, providing a measure of total reflex time; and by subtraction, reflex motor time was obtained. A split plot analysis of variance showed that no statistically significant difference existed between groups in any of the reflex time components. Also, the amount of Jendrassik facilitation was similar for all four groups. Thus, age and activity level showed no effect on normal or Jendrassik patellar reflex time components. The data suggested that the entire stretch reflex apparatus and the system of alpha-gamma linkage may be unaffected by age and level of activity.

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April 11, 1978
9:45 am

LATERALITY: ITS EFFECTS ON FATIGUE AND FRACTIONATED REACTION TIME. Cheryl J. Hanson and Geraldine K. Lofthus, University of California at Berkeley.

Surface electromyography enabled fractionation of a simple hand grip total reaction time (TRT) into peripheral and central processing components (motor time - MT, and premotor time - PMT, respectively). The objective of this study was to examine changes in these independent components due to induced fatigue, relative to laterality (dominant versus nondominant arms) and with respect to experimental subgroups (unilateral versus bilateral athletes). Strength and reaction time measures were determined for twelve female intercollegiate swimmers (bilateral athletes) and for twelve female intercollegiate tennis players (unilateral athletes) during five test sessions, each consisting of 30-50 reaction trials per arm. For the two treatment days, a 48% decrement in strength was achieved following a fatigue task consisting of serial maximal voluntary isometric contractions of five seconds duration. Dominant arm strength for all subjects was significantly greater ($p < .05$) than that of the nondominant arm, however there were no significant differences in the fatigue effects between arms. Following the fatigue exercise regimen, both PMT and TRT increased, while MT remained unchanged. The 48% strength decrement induced by the fatigue task was influential in delaying simple voluntary muscle responses to a stimulus. Regardless of the type of athletic training (swimming or tennis), response time was impaired for the hand grip task. The lengthened PMT may indicate the neurophysiological "weak link" to be within the central nervous system or at the neuromuscular junction for skilled athletes. It is speculated that an athletic skill which requires even greater precision, strength or motor control than the hand grip dynamometer task would show an even greater performance decrement following fatigue.

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April 11, 1978
10:00 am

CORTICAL ACTIVITY ASSOCIATED WITH PHYSICAL ACTIVITY. Peter Y. Wang, Illinois State University.

Right sided activity has been commonly associated with left brain (hemisphere) activity. School activity programs generally encourage the use of the dominant hand or foot, thus involving predominantly one side of the brain. This study attempts to determine the intensity of right and left cortical activity in groups who are identified as "dominant" or "ambidextrous" in performing activity. The ultimate purpose is to determine if activities should be presented in multilateral rather than unilateral method, when presented to children in the formative stage. Thirty-eight male-female college students volunteered to be subjects of this study. Two groups of 19 each were formed according to the subject's "manipulating rate" scores. The groups were called the "unilateral group" (dominant) and the "bilateral group" (ambidextrous). The subjects in the unilateral group scored quite differently with right and left hands in a manipulating task. The subjects in the bilateral group scored much the same with either hand in the same task. The Neural Efficiency Analyzer was used to collect the Neural Efficiency Score (NES), which reflects the intensity of cortical activity during the quiet and the performance states for each subject. Three sets of scores for each group were collected; they were: 1. Right and left hemisphere activity scores during the quiet state; 2. Right and left hemisphere activity scores during the right hand performance; 3. Right and left hemisphere activity scores during left hand performance. Then, these scores were compared and analyzed by using the sign test procedure. The data shows no significant differences in any of the comparisons except in the intensity of cortical activity in the two groups when using the left hand. In the case of the "unilateral group" (dominant, using the non-dominant left hand) cortical activity was approximately equal in both hemispheres of the brain. In the case of the "bilateral group" (ambidextrous, when using the left hand), the cortical activity of the right hemisphere exceeded that of the left. The inference here is that, there is a stronger relationship between left hand activity and right brain activity, when there is a greater facility for the activity as shown in the bilateral group. It would appear that, in the unilateral group, the intensity of cortical activity is diminished and is more dispersed during activity when using the non-dominant hand.

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April 11, 1978
10:15 am

AN INVESTIGATION INTO THE RELATIONSHIP BETWEEN CREATIVE ABILITY IN DANCE, FIELD INDEPENDENCE-DEPENDENCE, AND CREATIVITY. Mary Alice Brennan, University of Wisconsin-Madison.

The aim of this investigation was to examine the relationships among creative ability in dance, field independence-dependence and selected attributes of creative persons. Field independence-dependence measures (Rod and Frame Test, Embedded Figures Test), Guilford tests of divergent thinking (Alternate Uses, Making Objects, Plot Titles, Sketches), surveys of personality traits and biographic information (How Do You Think?, Biographical Inventory-Creativity), experts' ratings of creative ability in dance, and three movement performance measures of dance creativity were used as sources of data. Sixty-one female dance majors served as subjects. A secondary concern was the development of the measures used to assess creative ability in dance. Two methods were used to evaluate dance creativity: 1) an instrument on which experts' rated the subjects on the criteria of fluency, originality and flexibility, and 2) three movement performance tests based on Guilford's Structure of Intellect construct. Responses to the three performance tests were videotaped and rated by judges on the above criteria. Analysis of variance techniques were used to determine the reliability of the movement measures. A gamma coefficient association matrix was used to provide input data for a cluster analysis and a multidimensional scaling technique. A descriptive analysis provided further interpretation of the relationship between the 19 variables. The results indicate that the variables grouped themselves into five separate clusters in both the cluster analysis and the multidimensional scaling technique: A=movement performance tests (originality, flexibility), B=experts' ratings, C=divergent thinking tests, D=field independence-dependence measures, and E=movement performance test (fluency). With the exception that clusters A and B showed some relationship to one another in the multidimensional scaling, no meaningful relationships were found among the five clusters. Within the limitations of the investigation the following conclusions were drawn: 1) no meaningful relationships exist among the three constructs pertinent to the study, 2) two of the movement performance measures show potential as valid and reliable measures of dance creativity if further refined, 3) the two methods of evaluating dance creativity tend to identify the same individuals as more or less creative, 4) the more creative dancers were not more field independent than the less creative dancers, and 5) the more creative dancers were not characterized by more creative attributes than the less creative dancers.

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April 11, 1978
10:30 am

EFFECTS OF MOVEMENT EXPLORATION AND MIME ON BODY-IMAGE, SELF-CONCEPT AND BODY-COORDINATION OF SEVENTH GRADE CHILDREN.

Friedrich J. Schneider, Boston University.

The problem of the study was to examine the effects of a special course of movement exploration and mime on body-image, self-concept and body-coordination of seventh grade children. The sample consisted of 156 boys and 145 girls of the seventh grade. The experimental group (102 boys and 81 girls) participated in 15 lessons of a specially designed course of movement exploration and mime, twice a week, over a period of seven and one-half weeks. The control group continued with the regular physical education program (boys: soccer and flag-football; girls: soccer and basketball). The sample population was separated by sex for all phases of this program. Prior to, and following the period of instruction, students rated themselves on body-image and self-concept, and were tested on the four motor ability tests of the total Schilling body-coordination test. The researcher was responsible for the development and implementation of the program. Regular physical education teachers were instructed by the investigator in the content, teaching, methods and techniques of movement exploration and mime during two intensive three hour workshops and performed the teaching in both treatment and control groups. The statistical analyses were performed with the Finn multivariate analysis of variance and covariance computer program. The .05 level of significance was chosen. The seventh grade girls of the sample differed significantly from the seventh grade boys in balance, lateral jumping and lateral movement, while no differences were found in body-image, self-concept and hopping. The experimental group (boys and girls) showed significant positive differences in three of the four body coordination tests. Body-image, self-concept and balance remained unchanged throughout. Boys were identified to differ significantly in body-image and all four items of the Schilling body-coordination test after participating in the course of movement exploration and mime. It was concluded that movement exploration and mime has no significant effect on body-image, self-concept and balance of seventh grade children as a whole, but increases body-image and body-coordination performance levels in seventh grade boys.

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April 11, 1978
10:45 am

HORSE RACING: LAW AND CUSTOM. Jeffrey Segrave, Arizona State University.

The purpose of this study was to apply a theoretical model from the social science of law to explain the changing patterns of social consumption within the formal institution of sport. Specifically, Roscoe Pound's historical model of the functions of law was used in reference to the sport of horse-racing. Pound traced the developement of law from ancient to modern times. He concluded that in terms of major functions performed, the law evolved through four stages. In the first stage, the essential function of law was to keep peace. In more advanced societies, this function shifted to the maintainance of the conventional order. The third stage was identified as a direct product of the Age of Enlightenment. Legal theory changed with a view to securing a maximum of individual self-assertion. The final and current stage emphasised social justice. The decrees which established the early Greek festivals and old Irish Fairs were examples of attempts to promote peace through sport. Horse-racing was a central ingredient of these celebrations and implicit sanctions ensured that the participants were drawn only from the warrior elite. Later legislation was fashioned to support the maintainance of the 'status quo'. The socially exclusive character of horse-racing throughout Ancient Greece, fourteenth to seventeenth century England, and Colonial America, was maintained by definitive legal enactments. In England the sport was dignified by royal patronage and in Colonial America by the participation of the early southern social aristocracy. In accordance with Pound's model, throughout the late eighteenth and nineteenth centuries in both England and the United States, the relaxation of the laws pertaining to gambling and the commercialization of the turf permitted the participation of both lower and middle classes. Only in the United States on the dawn of the twentieth century was there a marked departure from this pattern when horse racing was officially prohibited due to the excesses in gambling. During the twentieth century, the dominant concern for social equality forced the formal institution of horse-racing in the United States to take account of the historical patterns of social discrimination against professional women jockeys, and in England to provide class parity in betting opportunities. In conclusion, study of specific legislation in reference to horse-racing revealed that the evolving patterns of social consumption were in great measure explained by the application of Pound's model.

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April 11, 1978
11:00 am

THE FIELD MUSEUM OF NATURAL HISTORY COLLECTIONS IN TRADITIONAL ATHLETIC GAMES OF THE NATIVE AMERICAN. Wilma J. Pesavento, University of Illinois at Chicago.

This study deals with determining the holdings in athletic sporting implements of the American Indian of the Field Museum of Natural History in Chicago. The Museum's accession catalogs were searched and holdings of athletic game implement were recorded. The recordings were organized by tribe and culture area as defined by the National Geographic Society of the United States. The study was delimited to the eight Native American culture areas within the geographic area of present-day United States and also to athletic game implements utilized by boys and girls and men and women. The Field Museum of Natural History possessed over 1000 athletic game implements from Native Americans of all eight culture areas in its anthropology collections. Its collection from Great Plains tribes was the most extensive; approximately two-fifths of its 1000 item collection was from these tribes. Six culture areas, namely California, Great Basin, Northeast, Northwest Coast, Plateau, and Southwest, also were well represented in the Museum's collections; approximately one-tenth of its athletic game collection has been obtained from tribes within each of these culture areas. The Museum's collection from Southeast Woodland tribes is scanty; perhaps three percent of its holdings was from these tribes. Some 60 Native American tribes have contributed to the Museum's athletic game implement collection. Again, more Great Plains tribes were represented in the collections than numbers of tribes from any other culture area. The traditional Native American missile games of archery, darts, ring and pin, snowsnake, and wheel and missile and the ball games of doubleball, kickball, racket, and shinny all were included in the artifact collections of the Museum. Its collection of wheel and missile implements was its largest in terms of the numbers of tribes from whom it possessed such tools. Next in size was its collection of shinny implements. The number of athletic game artifacts in the collections was extremely uneven when examined by tribal units; the range between the numbers of artifacts from various tribes was large. Within most culture areas there were a number of examples of tribes where the Museum possessed but one artifact of one game. At the same time within the same culture area, usually there were examples of tribes where the Museum possessed a number of artifacts from a number of games which approached or exceeded 50 in number.

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April 11, 1978
11:15 am

REMEDIATION OF COLLATERAL KNEE LIGAMENT LOOSENESS BY ISOMETRIC EXERCISES IN FEMALES WITH DEFINED LIGAMENT VARIABILITY.

Phyllis Love, Joel Rosentswieg and Marilyn Hinson, Texas Woman's University, Denton, Texas.

The general purpose of the investigation was to determine whether an isometric exercise program designed to increase the tension of the medial and of the lateral collateral knee ligaments influenced the stability of the knees of females. Female volunteers (N=56) met a criterion state of variability of the medial or of the lateral collateral knee ligaments; 1 standard deviation above the mean from a pilot study of 73 females. On the basis of the pretest (181 Ss screened), 3 major groups were formed according to the criterion state of variability: (a) Medial Group, consisted of those Ss who met the criterion of excess variability for 1 medial ligament; (b) Lateral Group, for those with 1 lateral ligament; and (c) Bilateral Group, for those with both lateral ligaments. The experimental treatment was randomly assigned to form 3 experimental and 3 control sub-groups. Each of the experimental subgroups performed an exercise designed for their respective ligament. The exercises were performed for 8 weeks, 5 days a week in the Human Performance Laboratory and 2 days a week at home. The task required 3 bouts of 6 repetitions, each held 10 seconds with a 5 second rest between repetitions. The data revealed that the isometric exercises were successful in increasing tension for those subjects with one "loose" ligament, but not for those with two "loose" lateral ligaments.

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April 11, 1978
11:30 am

HAMSTRING INJURIES--AN EXAMINATION OF POSSIBLE CAUSES. Wendell P. Liemohn, Indiana University.

Prior research conducted by the author suggested that there were a host of factors that could individually and/or synergistically be precipitators of hamstring strains. Part of the difficulty in isolating specific factors in the original study was attributed to event related idiosyncrasies (e.g., greater strength in take-off leg than lead leg in long jumpers). The purpose of this study was to attempt further elucidation of the precipitators of hamstring strains in college sprinters. The latter were chosen as subjects because they were found to be more bilateral relative to strength and flexibility than other track athletes. Demographic, strength, flexibility, and anthropometric data were collected on nine Indiana University sprinters in January, 1977. Since it was also believed that one's pelvic carriage, particularly under the stress of competition, could be related to hamstring strains, this factor was examined by filming four sprinters in practice and again in the Tennessee dual meet (both filmings were in May). Five of the nine athletes had sustained mild to moderate hamstring strains subsequent to the January data collection; however, two of the latter individuals recovered in time to be filmed in May along with the two sprinters who had not been injured. The characteristics of the sprinters sustaining hamstring strains were contrasted with comparable data on the non-injured. Data available on the ten sprinters from the original study were also used in the strength and flexibility comparisons. The findings included: (1) eight of the nine strains (1975--3, 1977--5) were to hamstrings of the left leg; (2) right thigh flexor-extensor strength was usually greater than left; (3) hamstrings of the non-injured sprinters tended to be proportionately stronger to their quadriceps; (4) hip-joint flexibility was usually greater in the non-injured sprinters; and (5) although the kinematic data revealed some differences in pelvic tilt between practice and meet conditions, the variances seen did not differentiate between the non-injured sprinters and the sprinters with a history of hamstring strains.

This research was supported by National Institutes of Health Grant PHS S07 RR7031-77.

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April 11, 1978
11:45 am

RESPONSE OF MUSCLE STRENGTH DURING RECOVERY FROM REDUCED INTRAMUSCULAR TEMPERATURE. Robert A. Oliver, Newberry College; Dewayne J. Johnson, Florida State University; Walter W. Wheelhouse, Vanderbilt University-Medical School, Paul P. Griffin, Vanderbilt University-Medical School

The purpose was to determine the effect of a localized thirty minute cold bath, to the dominant leg, on intramuscular temperature, cutaneous temperature, and plantar flexion strength, immediately after and during a three hour post-treatment period. Subjects were twenty female and male volunteers. Each subject was tested twice, on the same day of the week, at the same time of the day, for two consecutive weeks. During one test period, the subject received the cold bath treatment and during the other test period the subject served as a control subject. The order of treatments were randomly assigned. Measurements were taken eight times during the three hours. Plantar flexion strength, intramuscular temperature, cutaneous temperature, oral temperature, heart rate, and blood pressure were measured at each of the eight time intervals. Data were analyzed with analysis of variance for repeated measures and the Pearson-Product Moment Correlations. Results indicated that significant decreases in intramuscular and cutaneous temperatures occurred immediately post-treatment on the experimental days, followed by significant increases. Significant decreases occurred in intramuscular and cutaneous temperatures during the entire control session. Significant increases occurred in plantar flexion strength after sixty minutes post-treatment, during the experimental session for the remaining time. A significant correlation between intramuscular temperature and plantar flexion strength was obtained for the experimental session. The first, second and third greatest increases in plantar flexion strength occurred simultaneously with the first, second and third greatest increases in intramuscular temperature. This appears to indicate a relationship between the recovery from low intramuscular temperature and the ability to contract a muscle group at increased levels of tension. The ability to contract a muscle or a muscle group at a level greater than normal maximal levels of strength would have great implications in the areas of rehabilitation and athletic training.

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April 11, 1978
12:00 pm

RELATIONSHIP BETWEEN SOMATOTYPE AND BODY COMPOSITION TO PHYSICAL PERFORMANCE IN 7-12 YEAR OLD GIRLS. M.H. Slaughter, T.G. Lohman, and J.E. Misner, University of Illinois.

Although a considerable amount of information is available concerning the relationship of body structure and body composition to physical performance in boys, little research has been conducted on girls. Research on boys have shown a relationship between body composition and physical performance and between somatotype and physical performance. The best indices of physical performance for children of similar age and size were found to be measures of body fatness and linearity. Measures of mesomorphy and second component have not correlated closely with performance in children. Part of the lack of association with performance and second component may be due to the difficulty in validating various measures of lean body mass in children. The purpose of this study was to determine the association of somatotype and body composition to physical performance measures in 7 through 11 year-old girls. Somatotypes were measured by Heath-Carter's anthropometric method. Body composition was estimated as fat and lean body mass from ^{40}K measurement using a whole-body counter. Physical performance measures consisted of three tests of running: mile run, 600-yard run and 50-yard dash, and two tests of jumping: standing broad jump and vertical jump. Moderate relationships were found between somatotype components, measures of body size, and measures of body composition with the physical performance variables of running and jumping. The first and third components were more closely related to physical performance than the second component. Per cent fat and the first component when each are combined with age, height and weight accounted for a similar amount of the variation in running and jumping performance. LBM when combined with age, height and weight accounted for significantly more of the variation in running and jumping performance than the second component when combined with age, height and weight. The authors suggest that different combinations of anthropometric measures derived from multiple regression analysis might be found to replace the standardized deviation from height approach used by Heath and Carter in research relating the muscular component to physical performance in children.

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April 11, 1978
10:45 am

INTERTESTER RELIABILITY OF SELECTED SKINFOLD AND CIRCUMFERENCE MEASUREMENTS AND PERCENT FAT ESTIMATES. Andrew S. Jackson, University of Houston; Michael L. Pollock, Mount Sinai Medical Center; Larry R. Gettman, Institute for Aerobics Research.

This study examined the intertester reliability of selected skinfold fat and circumference measurements. Three testers independently secured seven skinfold fat and four circumference measurements on 35 adult men. The results showed significant intertester differences with four skinfold and three circumference measurements. When the sum of seven or three skinfolds were used, intertester differences were not found. The intertester reliabilities ranged from .93 to .99. When the skinfold or circumference measurements were combined by regression equations to estimate percent fat, the intertester reliabilities all exceeded .99. The percent fat estimates among testers were significant for the circumference measures, but not the skinfold equations. However, the differences among testers were small, less than 1.3 percent fat.

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April 11, 1978
11:00 am

BODY SIZE SPECIFIC DIFFERENCES AND PREDICTIONS OF VITAL LUNG CAPACITY AND RESIDUAL LUNG VOLUME. Victor L. Katch, Patty Freedson, Stan Sady, University of Michigan.

Differences in actual and predicted vital lung capacity and residual lung volume were investigated in 63 male subjects who were classified as either large, medium, or small using a sizing technique based on weight and height. Criterion vital capacity and residual volume were significantly different ($p < .05$) between the three different groupings of subjects (small < medium < large). When attempting to predict vital capacity or residual volume from height, weight, density, lean body mass, percent fat, chest girth, and age the standard errors of prediction ranged from ± 9-11% for vital capacity and ± 17-19% for residual volume. Additionally, attempting to validate equations for vital capacity and residual volume derived on small individuals against medium and large sized individuals, etc., or validating equations from the literature (Wilmore, Med. Sci. Sports, 2: 1969, Needham, Thorax, 9: 1954, Baldwin, Medicine, 27: 1948, Kory, Am. J. Med., 30: 1961) resulted in extremely large percent errors (± 18-26 percent for residual volume, and ± 10-14 percent for vital capacity).

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April 11, 1978
11:15 am

SKINFOLD THICKNESSES OF NORMAL SCHOOL CHILDREN WITH RESPECT TO AGE AND SEX. Russell R. Pate for the South Carolina Physical Fitness Test Steering Committee, College of Health and Physical Education, University of South Carolina, Columbia.

Our purpose was to establish a screening test for body composition which could be used as one component of a test battery directed at assessing health-related physical fitness in children. An assumption was that in children, as adults, the sum of several skinfold thicknesses is highly correlated with % body fat. Triceps, abdominal, iliac and thigh skinfolds (sfs) were measured in 1191 girls and 1398 boys (ages 6-18). Ss were students in 13 public and 3 private schools in South Carolina. Sfs were measured on the right side of the body, at standard sites using Lange calipers which were calibrated daily. Results revealed moderately high intercorrelations ($p < .001$) among the four sfs in both girls (.57 - .85) and boys (.71 - .90). High correlations were observed between each individual sf and the sum of the four sfs (Σ sfs), values ranging from .84 to .93 for girls and from .86 to .95 for boys. Development of multiple regression equations using pairs of sf measures to predict Σ sfs did not appreciably increase the R^2 above that obtained with the zero-order correlation of abdominal sf with Σ sfs (.86 for girls, .90 for boys). Linear regression analysis of Σ sfs on age yielded the following regression equations:

Σ sfs (girls) = 0.259 (age in months) + 23.721

Σ sfs (boys) = 0.057 (age in months) + 44.179

These equations and examination of the age/sex group means for Σ sfs indicated that mean skinfold thickness was quite stable for boys after age 8 but that in girls skinfold thickness increased gradually with age across the range studied. Percentile scores were computed for each sf and for Σ sfs for each age/sex category. On the basis of these findings and our subjective evaluation of the data collection process we concluded that measurement of abdominal sf is an appropriate and practical means by which to monitor the development of body fatness in female and male children. We recommend that the percentile rankings be used to identify those youngsters who fall at the high end of the distribution and that they be provided with obesity intervention programs.

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April 11, 1978
11:30 am

A COMPARISON OF BODY DENSITY VALUES DERIVED FROM UNDERWATER WEIGHING AND SKINFOLD PREDICTION EQUATIONS IN THREE GROUPS OF COLLEGE WOMEN. Patricia I. Fitzgerald, Southern Illinois University; Herb Weber, East Stroudsburg State College.

The accuracy of skinfold prediction equations used to predict body density for women has not been demonstrated. The purpose of this investigation was to determine the predictive ability of selected skinfold equations used to estimate body density of lean, normal, and obese college women. The body densities of the 55 volunteers were also determined by underwater weighing. The subjects (Ss),(age 18-29), were separated into three groups according to their percent body fat (determined from underwater weighing). (Group I: 18 Ss<20.4%;Group II: 15 Ss>20.5%<25.4%; Group III: 22 Ss>25.5%;Group IV: total). Residual lung volumes (RLV) were measured by the helium dilution method. A significant difference (P<.001)(one-way ANOVA), was found between means of body density determined by underwater weighing and the means of body density predicted by the skinfold equations. A Scheffe post hoc test found the difference for Group I (lean) and Group IV (total). In Group I there was a significant difference (P<0.05) between the means of body density determined underwater and each of the means of the selected skinfold equations. The post hoc test showed that for Group IV a significant difference (P<0.05) only occurred between the means of body density determined by underwater weighing and two of the selected skinfold equations, those of Wilmore and Behnke, and Sloan, Burt, and Blyth. These differences were not found for Group II (normal) or for Group III (obese). A significant difference (P<0.02)(t-test) in the RLV measurements made in air and underwater. RLV was significantly increased underwater for Group I. Skinfold regression equations were also developed for each of the three groups, and the total group. The results of a multiple regression analysis yielded equations for each of the groups with the following multiple R's: Group I: R= .86;Group II: R= .78;Group III: R= .72;Group IV: R= .86. The results of this investigation indicate that prediction of body density from selected skinfold equations was accurate for Groups II, III, and IV (with the exception of two equations in Group IV). However, prediction of body density determined by selecced skinfold equations was not accurate when compared to body density determined by hydrostatic weighing for Group I (with all equations), and Group IV (two equations were inaccurate).

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April 11, 1978
12:00 pm

AUTHOR INDEX

Name	Page
Acer, James M.	49
Adrian, Marlene	64
Allen, Robert E.	12,13
Allison, Thomas	88
Anderson, Margaret B.	77
Ansorge, Charles	46
Arnett, Chappelle	65
Auxter, David M.	93
Baker, John A.W.	45
Barlett, Harold L.	123
Barlow, David A.	78
Beaudet, Suzanne M.	76
Beiser, G. David	82
Belka, David E.	17
Bell, John A.	83
Bell, Frank D. II	70
Bergel, Reinhard R.	16
Blair, Steven N.	120
Blievernicht, David	2
Bobo, Mike	35
Boileau, Richard A.	87
Bonner, Hugh W.	28
Brennan, Mary Alice	134
Brown, Elizabeth Y.	14
Brown, Tim	50
Bruce, Russell	3
Buchanan, H. Edsel	44
Buffington, Cynthia K.	28
Burke, Edmund J.	30,84,107
Burke, Mary B.	102
Buskirk, Elsworth R.	123
Campaigne, Barbara	2
Campbell, Donald E.	79
Carlton, Les G.	23
Chapman, Brian R.	42
Chasey, Carol G.	96
Cheffers, John	7,115
Chu, Donald B.	41
Clarke, David H.	34,76
Clark, Jane E.	71
Clark, Mark W.	40
Clarkson, Priscilla M.	131
Clasen, Jack L.	74
Clifton, Marguerite	75
Cobb, Richard B.	15,54
Cone, Stephen L.	130
Cooper, W.A.	70
Cox, Richard H.	49
Critz, Jerry B.	86,90
Cundiff, David E.	36,37
Cureton, Kirk J.	87
Dailey, Gary L.	36
Dainis, Andrew	76
Daniels, Jack T.	91
Darst, Paul W.	114
deVries, Herbert A.	39
Dickinson, Arthur L.	109
Dodds, Patt	113
Donnelly, Joseph E.	108
Dotson, Charles O.	125
Dowell, Linus J.	62
Drash, Allen	88
Drowatzky, John W.	129
Dumin, Michael W.	73
Dunham, Paul L.,Jr.	128
Duthie, Pamela R.	97
Eason, Bobby L.	18
Edwards, Marigold A.	68
Engelhorn, Richard D.	22,60
Ensign, Cynthia P.	126
Evans, Richard	5
Falls, Harold B.	85
Fardy, Paul	82
Farrar, Roger P.	28
Fitzgerald, Patricia I.	145
Foster, Carl	91
Foster, Melvin V.	85
Fountain, Crystal	1
Franklin, Barry A.	123
Fratzke, Mel R.	48
Freedson, Patty	6,103,143
Fulco, Charles	105

Name	Page
Garfield, Douglas	84
Garrett, H. Leon	25
Gatti, Charles J.	106
Gettmann, Larry R.	31,142
Getty, Harold	117
Giacolone, William	75
Gibbons, Mark	82
Gilliam, Thomas	102
Girandola, Robert	29
Glad, Harold L.	106
Good, Larry	73,100
Grambeau, Rodney	6
Griffin, Paul P.	140
Hanson, Cheryl J.	132
Harrison, Aix B.	26
Haubenstricker, John L.	4
Haymes, Emily M.	109
Haywood, Kathleen M.	66
Hinson, Marilyn	138
Hird, David	5
Hoferek, Mary J.	10
Hoffman, Shirl J.	111,116
Holyoak, Owen J.	12,13
Hopp, Joyce W.	119
Howard, James	46
Howell, Richard	5
Humphrey,L. Dennis	85
Husman, Burris F.	54
Ismail, A.H.	56,70
Jackson, Andrew S.	33,83,142
Jackson, Charles W.	47
Jackson, Christina W.	47
Johnson, Dewayne	140
Johnson, Robert	82
Johnson, Wenda D.	58
Jones, Lawrence	30
Kamen, Gary	92
Katch, Victor	38,103,143
Kaufmann, David A.	89
Keane, Frank J.	7
Kearney, Jay T.	63
Klinger, Anne	64
Knowlton, Ronald G.	86,90
Knutzen, Kathleen	65
Kraft, Robert E.	94
Langford, Bruce A.	127
Langley, Thomas	120
Laub, Jan	46
Liemohn, Wendell P.	139
Leach, William F.	121
Leapley, Diana L.	118
Lersten, Kenneth	19
Lindhjem, Mary	104
Lisk, John	62
Lofthus, Geraldine	27,132
Loftin, Mark	124
Lohman, Timothy G.	55,141
Love, Phyllis	138
Lowy, Jay A.	27
Lubin, Ellen N.	59
Lundstrom, Edmund F.	48
Lussier, Louis	123
Lyndon, Mary C.	115
Mackes, Beverly E.	24
Magun, Jeffery	120
Mancini, Victor	117
Maresh, Carl M.	88
Markham, Stewart	78
Mattson, Irene	3
Meshizuka, Tetsuo	43
McCaulley, Mary H.	12,13
McGrain, Peter	20
McLellan, Jeffery C.	129
Meade, Thomas Jr.	30
Miles, Daniel S.	86
Milner, Edward K.	45
Miranda, Frederick	52
Misner, James E.	141
Moffatt, Robert	38,105
Morris, Alfred F.	76
Morris, Harold H.	61,117
Morrow, James R., Jr.	83,112
Noble, Bruce J.	88
O'Brien, Dianne B.	100
Oldham, Max	26
Oliver, Robert A.	140

Name	Page
Orfitelli, Michael A.	95
Pangrazi, Robert P.	114
Park, Roberta J.	51
Pate, Russell R.	33,144
Patterson, J.	22,60
Perry, Jean L.	55
Pesavento, Wilma J.	137
Phillips, Sally J.	71
Poindexter, Hally	112
Pollock, Michael L.	33,142
Pruett, Diane M.	67
Quinn, Gerald	8
Ragan, John	53
Reeve, T. Gilmour	130
Richards, James	78
Riggs, Charles E., Jr.	28
Riner, William	87
Rockefeller, Kathleen A.	107
Routon, J. Randy	101
Rosentswieg, Joel	138
Royce, Joseph	11
Ruhling, Robert O.	32
Sady, Stan	2,103,143
Sanders, Jack	80
Santa Maria, D. Laine	125
Sapp, Molly	4
Sargent, Roger G.	120
Saunders, Les	62
Sawka, Michael N.	86,90
Schack, Fred K.	98
Scheer, John	46
Scherrer, Donald G.	121
Schneider, Friedrich J.	135
Schuster, Rudolf	104
Schwane, James A.	36,37
Seefeldt, Vern	1
Segrave, Jeffery	136
Semler, Lorrie M.	21
Sherrill, Claudine	59,101
Shields, Sharon L.	25
Siders, Ronald A.	12,13
Simmons, Roger W.	21
Skrinar, Gary S.	111
Slaughter, Mary	141
Smith, Everett	64
Smith, Paul K.	72
Smith, Shelly Ann	81
Smith, Theresa L.	18
Sparks, Kenneth E.	109
Stamford, Bryant A.	38,105
Stevens, Richard	119
Stevens-Jefcoate, Christine M.	69
Stewart, Michael J.	110
Stull, G. Alan	63
Summers, William L.	44
Surburg, Paul R.	99,127
Svoboda, Milan	122
Swenson, Edward W.	89
Tench, Jesse L.	47
Timmer, James R.	32
Tuffy, Jean	84
Vaccaro, Paul	34
Villanacci, John	2
Vyhmeister, Irma	119
Wang, Peter	133
Ward, G. Robert	14,52
Weber, Herb	145
Weber, Marie L.	57
Wiedenback, Donna	116
Weltman, Arthur L.	38,105
Weinberg, Robert	53
Weinberg, William T.	54
Wells, Ward M.	48
Wheelhouse, Walter	140
Whieldon, Terry J.	61
White, John A.	8
Wilcoxon, Barbara R.	9
Williams, Harriet G.	17
Williams, Melvin H.	104
Williamson, C. Bennett	127
Wiswell, Robert A.	39
Yarbrough, Richard A.	91
Young, R. John	56,106
Zimmerman, Grenith	119

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